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WATER WORKS OPERATION

Introduction to a Series of Articles to Appear in Municipal Journal Dealing with Details of Maintenance and Operation Methods, Physical and Commercial, Field and Office.

Technical periodicals contain from week to week numerous articles describing the designing and constructing of water works systems and discussing the principles involved therein; but the articles dealing with details of the operation of such systems are very much less in number. And yet, while the construction occupies but a few months or years, the operation goes on indefinitely; and it is an oft-repeated statement that the success, effectiveness and efficiency of almost any public utility depends as much if not more upon the operating of it than it does upon its manner of construction. Moreover, the designing and constructing are generally performed by engineers and contractors who have made a specialty of this line of work and are presumably well-informed as to how it is best to perform it; while the operation is frequently undertaken by men who have had little or no experience in this line of business and must learn all of its details from personal experience or by information obtained elsewhere.

For this reason, it would appear to be desirable that information concerning the operation and maintenance of the various features of water works plants should be given a much more prominent place in technical literature. Accordingly we are expecting to publish during the next few months a series of articles dealing with this subject, in which we shall endeavor to summarize the information obtainable from various sources, including our own experience. It is hoped that these articles will serve as a stimulus to water works superintendents to contribute more generously suggestions derived from their own experience; and we urge all who have any new or valuable ideas to offer to send them for publication in the columns of Municipal Journal.

There is a very wide variety of features that go to make up water works systems in various sections of the country, and in making any comprehensive review of the subject of operating and maintaining water works, this diversity suggests the desirability of a classification of the discussion, since suggestions applicable to one plant may be of no pertinence whatever to another.

The physical features of a water works may be broadly divided into those of head works, which would include intakes, storage reservoirs, wells, etc., and pumping plants; treatment plants; regulating works, comprising chiefly distribution reservoirs and stand pipes; and the distribution system proper.

Each of these will have a greater or less number of subdivisions. For example, the intake may be located on a small stream, in a large river, or far from shore in a large lake. The wells may be shallow dug ones or tube wells several hundred feet deep. Pumping plants may be operated by steam, internal combustion engines, electricity or water power. The treatment plant may consist of a simple liquid chlorine plant which is almost automatic in action, or may be an elaborate combination of sedimentation tanks, softening apparatus, sand filters, and chlorinating apparatus requiring expert attendance.

Under the head of distribution system, we have to consider the several kinds of pipe used (this is of special interest at this time, when the cost of cast iron has increased to such excessive amounts); but the greatest amount of information probably will have to do with minor details of every day practice, such as excavating and backfilling, tapping pipes for corporation cocks, inserting large branches in mains under pressure, the various kinds of service pipe that have been used and the effect of various characters of water and soil upon them, the use and location of meters, thawing and other maintenance operations involved in the care of fire hydrants, and a score of other items of detail.

In addition to these physical features of operation, we have the business features which to many superintendents are even more vexing and perplexing. These include, among other things, the fixing of rates which will be adequate to secure a proper income without involving either loss or undue profit and which shall apportion the cost of maintenance in a fair manner between the small consumer and the large. We have in addition the details of office practice, such as keeping records of the physical features of the plant; the keeping of the accounts of consumers and making out and delivering bills; the keeping of records of individual meters and the testing of meters to determine their accuracy and reliability from time to time; the soliciting of new business; and in general, the maintaining of a cordial feeling between the public and water department or company.

There must always be borne in mind certain of the larger features of maintenance which need definite action only occasionally, but which action cannot, without serious detriment to the plant, be postponed beyond a certain period. We refer to the maintaining of the pumping plant adequate to the growing needs of the service, the securing of additional capacity before the existing plant has so nearly reached its limit that an emergency demand may find it lacking; the reinforcing of the distribution system by larger or additional feeder mains in order to insure adequate quantity and pressure of supply at all parts of the city; the inauguration of treatment of the water that may be called for more and more urgently by increasing danger of pollution; and various other changes or augmentations in the main features of the plant that are made desirable from time to time by the growth of the service or by other conditions that change but slowly but which demand that the plant be adapted to them.

Of all of the physical features of water works plants, the distribution system is apparently the only one that is common to all plants, and we purpose to begin with the consideration of this in the series of articles herein referred to. As the first installment, we present this week a tabular summary of the practice of several hundred cities relative to the use of mechanical appliances, thawing frozen pipes and hydrants, and routine valve inspection.

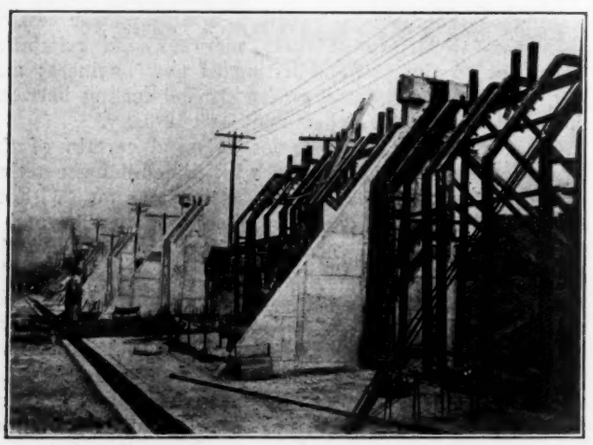
HIGHLAND PARK RESERVOIR

An Unusually Large Reinforced Concrete Reservoir, Consisting of a Thin Wall Supported by Numerous Buttresses—Forty-five Million Gallons Capacity—Appliances Used in the Construction.

A reinforced concrete reservoir 1,373 feet long, 294 feet wide and 14 feet deep, with a capacity of 45,000,000 gallons, has just been completed at Highland Park, Michigan, a suburb of Detroit, at a cost of $295,000. This is a part of a new plant demanded by the rapid growth of the community, another feature of which will be a rapid sand filtration plant with a capacity of ten million gallons a day and estimated to cost $300,000.

Water is obtained at Lake St. Clair, eleven miles distant, where is located an intake crib and pumping station. From here water is pumped to the reservoir, which it enters at the south end through a gate chamber, through which also passes the outlet pipes. Gates in this chamber are so arranged that in an emergency, or when cleaning the reservoir, water can pass from the inlet to the outlet pipes without entering the reservoir. The water passes the gate chamber through a system of pipes that discharge it at different points throughout the area of the reservoir so as to secure circulation. A 54-inch concrete pipe down the center of the reservoir, provided with laterals, serves this purpose.

For draining and flushing out the reservoir, there are four gutters running lengthwise of the reservoir and four branching from them crosswise of it. Eight 6-inch force mains enter the reservoir, provided with risers through the floor near the cross drains, arranged for attaching hose to them, to be used in washing off the floor.



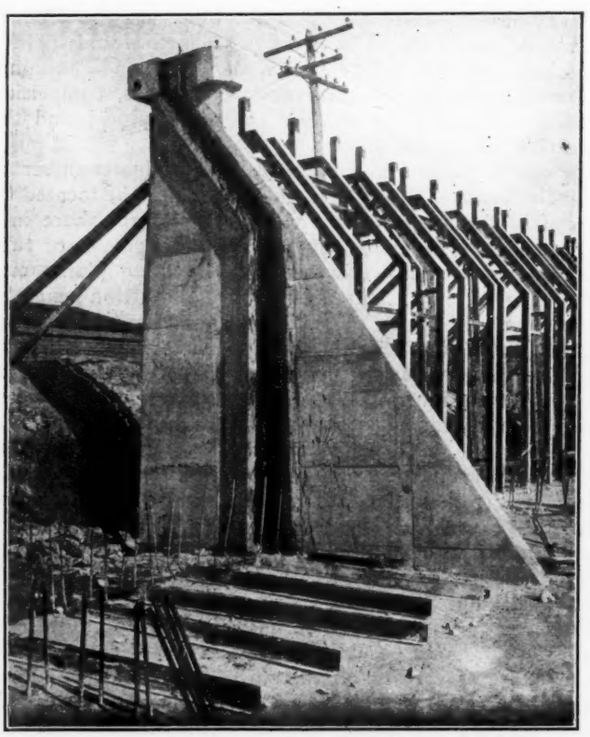
STEEL FRAME FOR OUTSIDE FORM OF CURTAIN WALL. Six completed expansion-joint buttresses in the background. Reinforcement for intermediate buttress in foreground.

Excavation for the reservoir was performed with three steam shovels and about 70,000 cubic yards of earth was removed, which was readily disposed of in the vicinity. The excavating cost 26 cents a cubic yard, which was below the estimate.

The concrete floor was placed by F. C. Austin Co. paving mixers that spouted it for a radius of 25 feet from the mixer. Steel pavement forms were used and the floor was placed in 50-foot strips. As a part of the floor there were constructed wall footings, in which were set stub reinforcing bars to which were connected later the reinforcement of the wall and its buttresses.

The wall was strengthened by buttresses at short intervals extending into the reservoir and well reinforced, the reinforcing bars being tied to the stubs just mentioned. The forms consisted of steel beams and plates, as shown in the illustrations. These were obtained from the Hydraulic Pressed Steel Company. Each 52 feet there was a buttress, in each face of which was a groove that served as an expansion joint, this groove being lined with asphalt-saturated felt before the wall was cast against it. These expansion-joint buttresses were cast first; following which the wall and the intermediate buttresses were cast as a monolith, two 52-foot sections and two expansion-joint buttresses being poured in a day, after the forms were erected.

For making and placing the wall concrete, there were used a mixer and inclined elevator, the whole traveling on wheels along and close to the wall. The mixers (built by the Jaeger Machine Company) delivered the concrete into skip cars. These were lifted up along an inclined track carried by a trestle, to an elevation considerably higher than the top of the wall, where the cars dumped the concrete into a chute that discharged it into the forms. The concrete aggregate was brought to the mixer in trains of side-dump cars traveling on contractor's track laid on the reservoir bottom. The several illustrations give an excellent idea of the general appearance of the reservoir and of the construction methods.



EXPANSION JOINT IN BUTTRESS. These joints were placed at intervals of 52 feet along the wall. The grooves were lined with asphalt felt. On top of each expansion-joint buttress was placed a light standard, the base for which is seen at the top of the buttress. Other buttresses, monolithic with the wall, were placed at intervals of 13 feet. All buttresses were tied to the concrete bottom of the reservoir by means of reinforcing bars, those for one buttress being seen in the foreground.

AFTER-THE-WAR PRICES ON WATER WORKS CONSTRUCTION.*

Cost of Labor and Material May Go Higher—Will Not Fall to Former Rates for a Number of Years, if Ever.

After-the-war prices on water works materials has greatly concerned superintendents of both municipal and privately owned water plants, but now that the war is on its fourth year and no end in sight, the public is gradually adjusting itself and becoming reconciled to war prices. The water works officials who have withheld improvements and postponed purchases, now find themselves in a sorry plight by facing a prospect of still higher prices after the war. Had the war been of short duration, things would have been different. The war has already lasted long enough to establish new economic conditions that will not be abandoned when the war is over.

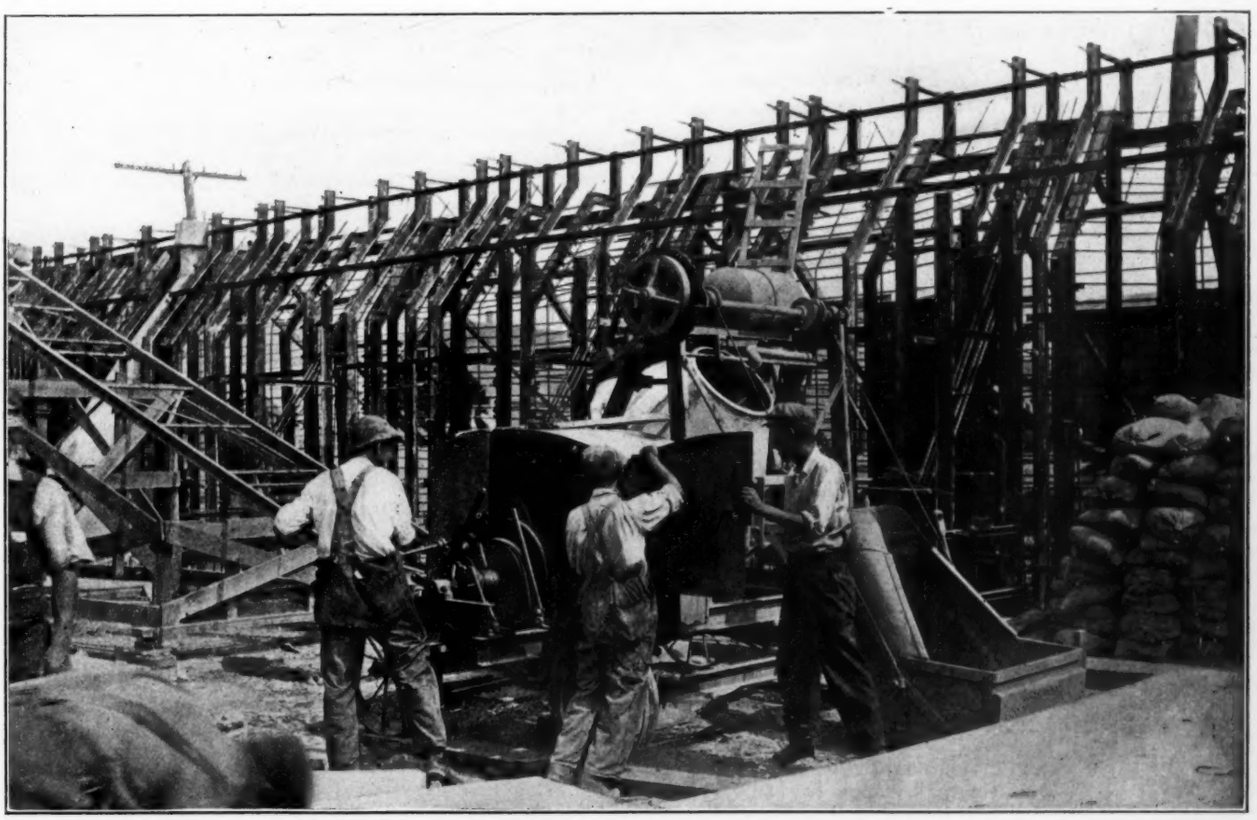
The price and availability of labor, both skilled and unskilled, is one of the chief determining factors of prices. Mechanics and skilled workers in pump factories, valve and hydrant factories, meter factories and pipe foundries, are now receiving about twice to three times their former wages, and the labor having once accustomed themselves to short hours and high wages, new habits of living are formed. Imagine in your own case if, after enjoying for several years two hundred dollars per month, you were required to readjust your affairs to a salary of one hundred and fifty dollars. You probably would not accept it, but engage in something else of a similar nature. Labor of unskilled kind would not be content with reductions, and the labor that has gone to war will, upon coming back, be of an entirely different character from what it was when it left the water trenches for the fighting trenches. A few years' fighting for his country, seeing new lands, new cities and mingling with intense activity will completely transform the man to one of higher ideals and aspirations. He will no longer be content with the menial tasks. He will learn that he is capable of doing bigger things. The contractor, the farmer, the foundryman and the manufacturer who are looking for their labor back again after the war will look in vain, for their mental, moral and physical changes will be so great that the men who return will have other things in view.

Labor cannot help being the scarcest commodity in America for at least several years after the war. Previous wars, although trifles compared with this war, were examples of producing a scarcity in labor for years following their close.

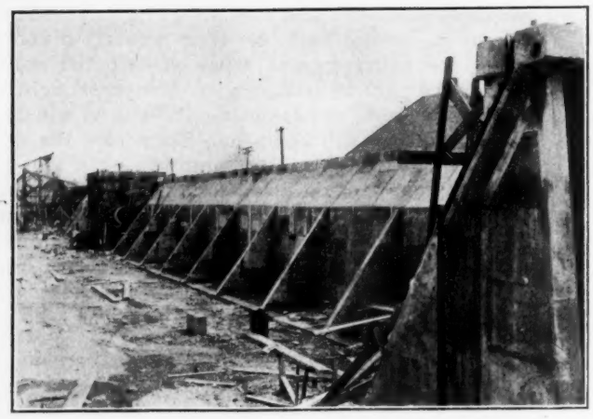
A wonderful equalizing effect will also result. The restoration of ruined cities in Europe will attract American engineers, contractors and material dealers. We are now, as a result of our new knowledge of the world, bidding on foreign work with the same keenness as if the job were in the adjoining city. The immense merchant marine now used for war purposes will convey labor and materials readily to every part of the world. France, South Africa or Egypt will be almost as accessible as remote parts of America.

Foreign countries will not have the barriers that formerly existed. Our machinery, pumps, pipe, meters, filters and supplies of every description have, since the war started, been tried out and were so well liked that American factories are now busily engaged in shipping water works supplies to China, South Africa, Palestine

*Paper presented by R. E. McDonnell (of Burns & McDonnell, consulting engineers) before Southwestern Water Works Association, Tulsa, Oklahoma, April 24, 1918.



FORM FRAMES AND REINFORCEMENT FOR HIGHLAND PARK RESERVOIR.
Note the elaborate form construction. In the foreground is the concrete mixer; at the left is the bottom of the inclined track up which the skip car carried the concrete, to dump it in to a chute at the top.



SOUTH WALL OF HIGHLAND PARK RESERVOIR.
Gate chamber in the mid-distance.

and all South American republics; in fact, all over the world. Our mechanical filter plants have so pleased the South American countries that they will not be satisfied with any other. One of our assistant engineers now in Uruguay, supervising the installation of a water works, lighting and sewerage system, writes that the Uruguayan officials are so well pleased that American engineers, contractors and materials will have the preference. These markets opened up since the war are not going to close after the war.

A demand has been created that will continue, and demand is one-half the cause of price making. If the labor to produce the supply is going to be scarce, we then have a scarcity of supply and an increase in demand—two functions that tend to maintain high prices. Many cities have waited and continue to wait, expecting lower prices. Cities requiring water purification plants have continued to use polluted supplies, thereby endangering the health of their citizens, all because of a mistaken idea that prices would be lower. Fire protection equipment, both in pumps, larger mains and fire apparatus, has been postponed, awaiting lower prices after the war, until now we have inadequate fire protection in many cities. This condition, already alarming, is made doubly worse by the frequency of incendiary fires throughout the country. The holding off of these improvements until after the war would increase the normal demand to the point of producing an increase in prices following the war. Cast iron pipe, the largest item of cost in water works construction, is held down in price now only by the governmental control of the pig iron price, and with foundries already petitioning the Government to permit an increase, one can readily see that with the governmental control removed, the price would immediately go upward. The same is true of the copper market control. The demand for copper was never greater in the history of the world and when the Government regulation of price is removed, copper will immediately go upward to meet the demand. Cities, therefore, holding back lighting improvements or electrifying their pumping plants in anticipation of lower prices, are going to meet with disappointment. The war demand for water works materials has been no greater than similar demands for all classes of commodities. The use of American materials in the war has served to demonstrate their adaptability, which, in itself, will create new markets. One of the remarkable achievements of the war accomplished through American water works materials, was the capture of Palestine from the Turks. The capture of Palestine in the past was attempted many times in the last fourteen hundred years, and the British attributed the failures to the lack of water supply. With the use of American made pipe, pumps and valves and equipment, a ten-inch pipe line was laid one hundred and fifty miles across the desert, supplying drinking water for the troops, camels and munition trains. The pipe being carried in by use of camels, water was made available for use as the pipe laying progressed.

Facts taken from history give excellent precedents as to what we may expect in the future prices. In the period covered by the French Revolution, America was also engaged in war with England, so that at that period the whole civilized world was at war. While business was small then, yet prices went through the same performances they are repeating today. Prices after the war rose and remained at the maximum during the war for a period of about five years after the close of the war. In 1864 the increase was about fifty per cent above the normal of 1851. The decrease toward normal was only about twenty per cent, covering several years, with a sharp increase again at the Franco-Prussian War in 1871, and the prices did not return to normal until 1880, ten years after the close of the Franco-Prussian war.

GENERAL VIEW OF HIGHLAND PARK RESERVOIR.
54-inch concrete pipe down the center. Longitudinal drainage ditches on each side of the pipe line.

Prices in time will undoubtedly seek their normal level, but cities, like individuals, need water for their growth. Can we afford to stunt the growth of a community by waiting for lower prices? This question has been carefully studied by those best competent to know. Recently a report was made by the New York Board of Water Supply to the Mayor of New York, which states that "there are no convincing evidences that labor and materials will be less expensive now than for several years to come," and further makes the suggestion that "many well informed persons are of the opinion that the tendency will be higher and still higher prices for water works commodities." The report closes with the recommendation that the city's interests will be best served by the continuous and speedy prosecution of the water works improvements to their final completion.

Water is fundamental to the growth and prosperity of every community. An abundant supply of good pure water is a city's most valuable asset. Its industries cannot be secured or maintained if the water supply is inadequate.

The Capital Issues Committee of Washington, D. C.,

in giving approval to water works bonds, has gone on record as to water supplies and their improvements as being an essential improvement, and all worthy projects are meeting prompt approval.

The essential feature in the whole problem to consider is the responsibility of the water works profession toward the health of the community. Nothing has such a great bearing upon the health of the community as the quality of the water. Can the water boards, mayors, superintendents and engineers afford to defer improvements when that postponement may mean an epidemic of typhoid or other water borne diseases? The loss of lives cannot be justified by the saving in dollars.

EXTENSION OF WATER MAINS

Powers and Obligations of Municipalities and Private Water Companies to Extend Water Mains—Determined by Reasonable Needs of Community.

By JOHN SIMPSON.

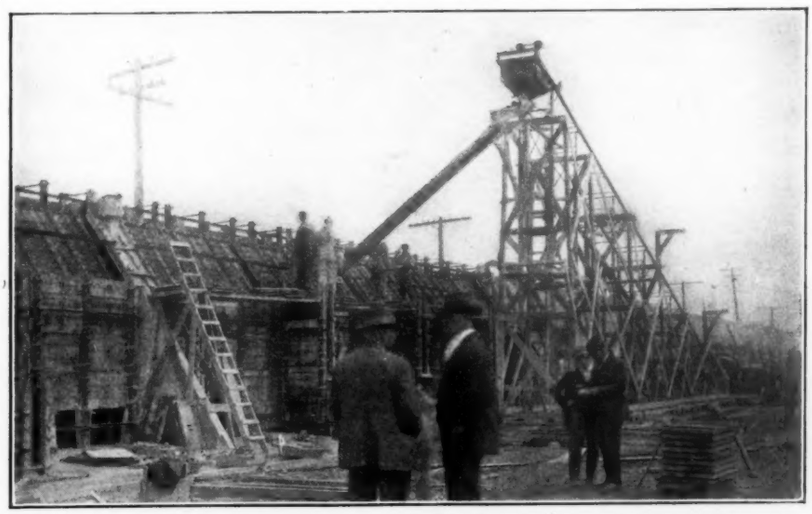
The power of a municipality to extend water mains, or to maintain them in particular places, is, in its nature, legislative and governmental in the absence of statute, and must of necessity be discretionary. If municipal authorities were compelled to construct or maintain water pipes whenever courts or juries might think proper, there would be an entire subversion of municipal government and control. Linck v. City of Litchfield (1888), 31 Ill. App. 118.

The council in each case must determine whether the necessity exists for the extension of a main to a particular territory, and what size main is needed, and whether the financial condition of the city will warrant the expenditure. Browne v. Bentonville (1910), 94 Ark. 80.

In Turners Falls Fire Dist. v. Millers Falls Water Supply Dist. (1905), 189 Mass. 263, 75 N. E., 630, it was held that a contract by a municipal corporation to supply water to its inhabitants did not require the water district to extend its mains to territory subsequently added to the municipality.

In Moore v. City Council of Harrodsburg (1907), 105 S. W. 926, the Kentucky court of appeals said: "The city officials are charged with the administration of the affairs of the city. They must determine when and where water mains must be put in, and when and how an electric light line must be extended. The courts cannot undertake to manage the affairs of a city by injunction. Where a public duty is enjoined, the court may require the city authorities to act, but it cannot control their discretion as to how they shall act. The city authorities are on the ground. They live among the people who pay the taxes. They can judge much better than we can as to what the best interest of the city requires. In the absence of fraud, corruption, or arbitrary action, the management of the affairs of the city is beyond judicial control."

A resident of South Gardiner, Maine, sought by mandamus to compel the trustees of the Gardiner water district to extend the water mains of the district to his residence, a distance of about five miles. His petition was denied. Lawrence v. Richards (1913), 111 Me. 95. The court said, with reference to the plaintiff's contention that the district was bound to supply every inhabitant with water: "If this contention has real merit, the consequence is that the trustees, acting for the district, are legally bound to supply water to all inhabitants, no matter how large the cost of the undertaking, nor how small the revenue, and no matter how ruinous and destructive the result might be to the financial ability of the district to carry on its operations. That this contention is not sound is, we think, easily demonstrable. The area of the district outside of the city proper and South Gardiner is scatteringly settled. The elevation in some places is considerably higher than the system's reservoirs. It does not need the testimony of expert engineers to satisfy a reasoning mind that under such conditions the expense necessarily to be incurred in performing the duty, as it is claimed to be, of supplying every inhabitant of the district with water would practically be destructive of the purposes of the charter. It would create a burden too heavy to be borne. Did the Legislature contemplate and intend such a possible result? Did the Legislature intend, when it empowered the cities of Lewiston and Bangor to own their water systems, with powers and duties with respect to the water supply similar to those of the Gardiner water district, that those cities were bound to furnish water over the entire extent of their territorial areas? We do not think so. It is a matter of common knowledge that water systems in towns or cities containing both an urban and a rural population, whether the systems be owned privately or municipally, never have been in fact, and are not now, anywhere, extended beyond the more compact parts of the town into and through the rural parts. It is practicable in the rural parts for inhabitants to supply themselves. In the thickly settled parts it gradually becomes inconvenient, impracticable, and sometimes impossible for the inhabitants to do so. Sources of supply become exhausted or defiled, and the need for more water, which the inhabitant cannot well furnish for himself, becomes imperative." In a later Maine case, Watson v. French (1914), 112 Me., 371, it was said, though not necessary for the decision of the case, that a water company is not compelled to extend its mains at the request of individual consumers. In Bothwell v. Consumers' Co. (1907), 13 Idaho, however, the court said, also *obiter*: "The company in the enjoyment of its franchise privileges is placed by the constitution under a public duty to supply water to all living within the franchise limits on payment of the rental rates. It owes this



POURING CONCRETE WALLS OF HIGHLAND PARK RESERVOIR.
Forms shown in place in foreground. In the background, concrete chute, skip dumping into same, and inclined track up which skip travels.

duty to everyone so long as it has water to sell, whether he be on the line of its main or at a great distance therefrom."

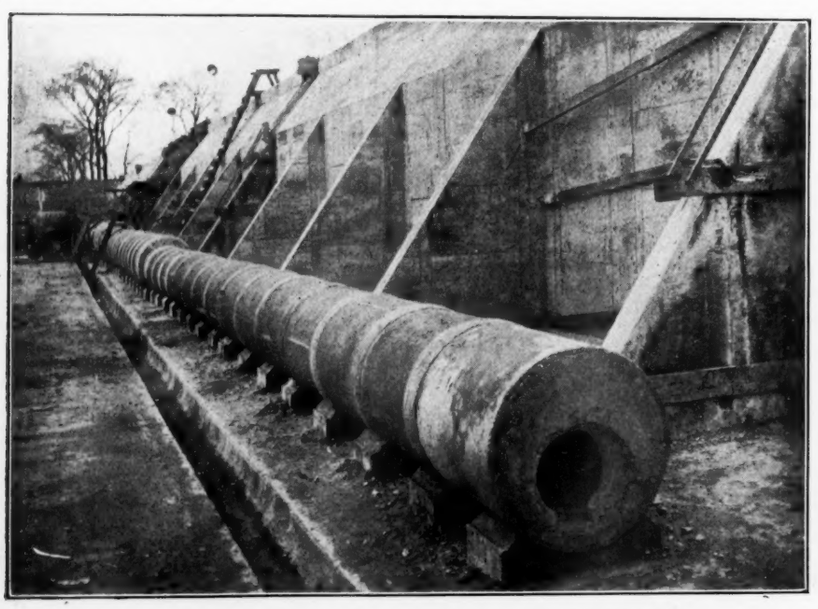
The duty of water boards to make extensions may, however, rest on statutes. Article 8, section 224, of the New York village law provides that a system of waterworks established under the article shall be under the control of the board of water commissioners, and that the board shall keep it in repair, and "may" extend the mains within the village, if the expense in any one year, in a village of the fourth class, shall not exceed $500, etc. It is held, People v. Pierce (1909), 119 N. Y. Supp. 21, that the word "may" would be here construed as meaning "must," and the board could be compelled by mandamus to make the extensions.

The California supreme court holds, Lukrawka v. Spring Valley Water Co. (1915), 169 Cal. 318, 146 Pac. 640, that when a water company accepted a franchise offered by the state, it assumed a contractual duty to be discharged for the public benefit—a community service commensurate with the privileges of its franchise requiring it to provide a system reasonably adequate to meet the wants of the inhabitants at its commencement, and also to extend the system as the reasonable wants of the growing community should require, so that, when in a position to make reasonable extensions of its mains bounding a populous part of the city of San Francisco, it was bound to and might be compelled to do so. This right to compel an extension to serve the inhabitants of a particular section of its territory is not, however, an absolute and unqualified right, but only to make an extension where there is a reasonable demand, depending on the particular facts of the case. The matter of expenditure to be entailed on the company in extending its service is not a controlling feature in determining the reasonableness of a demand for it, because the water rates established as a whole between the public service corporation and the city by the public body to which that duty is committed must be sufficient to yield a fair, just and reasonable income on the property of the company devoted to public use which would include such necessary expenditures. But additional expenditure by the company or an additional burden on the water rate payers as a whole should not be imposed for the benefit of a particular portion of the community unless a reasonable necessity for it exists.

A water company may, of course, contract to extend its mains to supply all the inhabitants within the territory for which it holds its franchises, and in such case it may be compelled by the mandamus to make the extensions. City of Topeka v. Topeka Water Co. (1897), 58 Kan. 349; Bourke v. Olcott Water Co. (1910), 84 Vt. 121. A provision in a city ordinance that a waterworks company shall extend its water mains "when requested to do so by a majority of all votes cast at any general or special election at which the proposition of such extension shall have been submitted to the people" means that the company is not required to make an extension unless a majority of all those voting on any proposition at such election vote in favor of the extension. Illinois Trust etc. Co. v. City of Burlington (1909), 79 Kan. 797.

By an amendment to the charter of the city of Hartford, its board of water commissioners was authorized, in 1865, to take the city's water supply from certain streams in the town of West Hartford, on condition that it would furnish the water to the inhabitants of that town who lived "within a reasonable distance from the line of main pipes," upon the same terms that it furnished the water to its own citizens. In an amicable statutory suit brought by the selectmen of the town on behalf of its inhabitants and property owners, to determine their rights and the powers and duties of the board, it was held, West Hartford v. Board of Water Comrs. of Hartford (1896), 68 Conn. 323, that the question whether an applicant for water which the board might refuse to furnish lived within a "reasonable distance" of the main line of pipes was for the determination of the courts.

Before ordering extension of a water company's mains a public utilities commission should be satisfied that the extension is within the scope of the original professed undertaking of the owner of the utility, and that after the extension is made, the owner will be insured a fair return upon his whole investment. Murray v. Public Utilities Commission (1915), 27 Idaho, 602. The Maryland supreme court holds, Public Service Commission v. Brooklyn & Curtis Bay Light & Water Co. (1914), 122 Md. 612, that section 42 of chapter 180 of the Maryland Acts of 1910, although giving to the public service commission broad powers over water companies, does not authorize it to require a water company to extend its plant into territory it has not attempted to serve, when the probable revenues would be insufficient to pay the cost of the extension and maintenance.



LATERAL PIPE IN HIGHLAND PARK RESERVOIR.
Drainage gutter shows just inside the line of concrete pipe.

Various public utilities commissions have recently had under consideration the subject of the extension of water mains within and without municipal limits. The California railroad commission in a general order of August 12, 1915, held that a water, gas, electric or telephone utility which operates under a general franchise authorizing the occupancy of all the streets of a municipality shall make, at its own expense, such street extensions as may be necessary to serve applicants; provided that in any case in which the construction of an extension at the utility's sole cost will in its opinion work an undue hardship upon the utility or its existing consumers, the matter may be submitted to the commissioners. It was thought not feasible at that time to establish a general rule defining free limits for extension outside of municipalities. The commission asked the utilities to be as liberal

as possible in the construction of extensions, but regard must also be had to the utility's financial condition and the rights of existing consumers. The Montana Public Service Commission holds (1915) that it cannot establish rules and regulations governing the extension of water mains in new localities, since the necessity for the extension must be determined from the facts of each case. The Nevada Commission, Public Service Com. v. Water Co. of Tonopah (1915), ordered a water company to make certain extensions to supply prospective customers where it appeared that the added income therefrom would return the company from 30 to 36 per cent on the necessary investment. The Kansas Commission holds, Leavenworth v. Leavenworth C. & F. L. Water Co. (1915), that a franchise provision that a water company shall not be obliged to extend its mains until an annual income of at least $125 per block is guaranteed is unreasonable. The West Virginia Commission holds, South Buckhannon v. Buckhannon Light & Water Co. (1915), that whether a water company undertaking to supply a municipality and its inhabitants may be required to extend its mains to supply all applicants where the return therefrom is insufficient to pay interest on the cost and outlay and to cover the natural depreciation and a proper proportion of the operating system depends on the reasonableness and necessity of the demand in each particular case.

WATER WORKS OPERATION STATISTICS

Information Contributed by Superintendents in About Four Hundred Cities Arranged in Tabular Form—Mechanical Appliances Used in Trench Work—Freezing and Thawing of Hydrants, Mains and Services.

In obtaining information for our annual water works statistics this year, we have confined ourselves largely to that dealing with the operation of water works, and in the following tables we present data furnished by superintendents of about four hundred water works plants relative to the labor-saving mechanical appliances used by them in excavating, backfilling or tamping trenches, in caulking pipe joints, and in inserting branches. Also, information concerning the practice of each city in making routine inspection of street valves. Considerable information was furnished relative to the experiences of the several cities with freezing of fire hydrants, mains, and services last winter and the methods employed in thawing them.

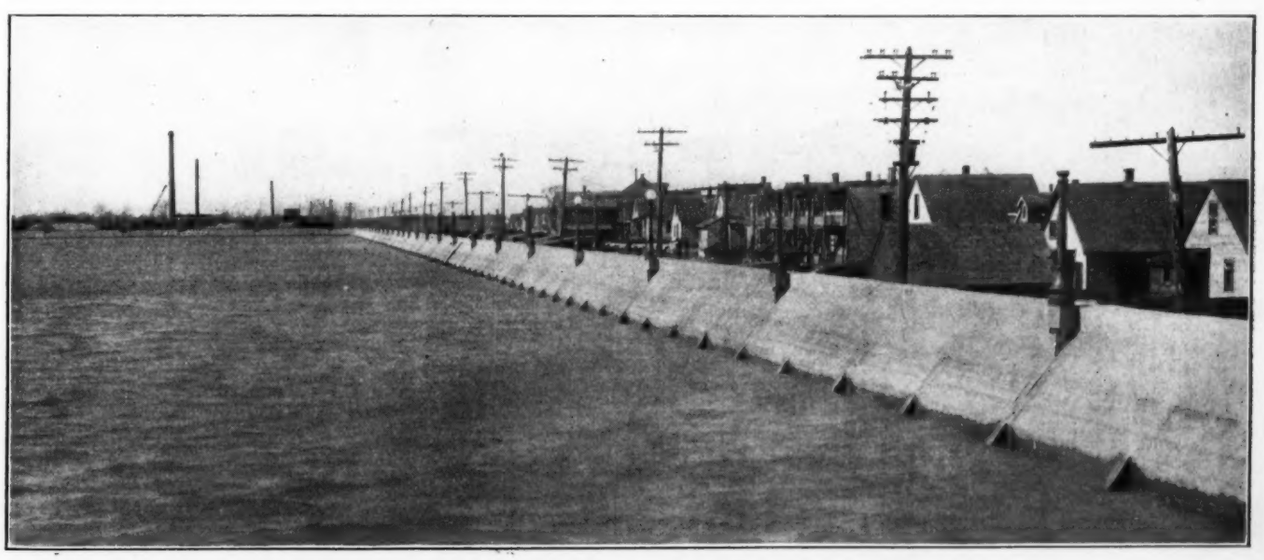
In later issues still further data will be given concerning cleaning of mains; methods employed for detecting and preventing leakage and waste; extent of the use of meters and practice as to ownership, rental charge, etc. Estimates of the amount of water which each city uses for municipal purposes and the amount that it obtains without any direct payment therefor, have been furnished by most of the cities. The frequency with which analyses of the water are made and whether by the cities' own experts, the state department of health, or private laboratories, and the quality of water, were covered by another set of replies, while the final question dealt with the use of watersheds and grounds around reservoirs and at pumping stations for public enjoyment as parks, picnic grounds, for skating, etc.

In the first table, a number of superintendents reported machines for making taps in reply to our question referring to those used for "inserting branches." These replies were omitted from the table, and only those machines included which were used for inserting pipes larger than 2 inches.

In the second table, in answering the second question a considerable percentage of the cities reported, as a part of the inspection service, inspection for leaks around the valve stem, the repacking of the stuffing box, oiling, cleaning out the valve box, etc. As it is assumed that any inspection which involved operating the valve would include this attention when shown to be necessary, this portion of the replies was omitted. Several cities reported as part of their inspection the locating of each valve (we presume by referencing it to prominent objects on the street surface); but as it would not seem to be necessary to do this more than once for each valve, this was not included in the table as a part of routine inspection.

While the use of electricity for thawing services and occasionally for thawing mains has become quite common during the past few years, we did not expect to find

(Continued on page 377.)



HIGHLAND PARK RESERVOIR NEARLY FULL OF WATER.
Shows the light standards on top of each expansion-joint buttress; also the tops of all the buttresses.

APPLIANCES USED IN WATER WORKS OPERATION.

City and state	Labor-Saving Mechanical Appliances Used: Excavating trenches	Backfilling or tamping trenches	Caulking pipe	Machines for Inserting Branches in Mains: Owned or rented	Kind Used.	Largest size of branch inserted, inches.
California:						
Glendale	.....	Scraper operated by motor truck	.....	....	.....	..
Los Angeles	Steam shovels for large trenches, Austin and Buckeye for small ones	.....	.....	Own	Mueller	8
Redlands	.....	.....	.....	....	Mueller	4
Colorado:						
Colorado Springs	Contract all over 500 ft.	.....	.....	Own	A. P. Smith	12
Longmont	.....	Slip	.....	Own	.....	..
Connecticut:						
Bristol	.....	.....	.....	Own	Water Works Equipment Co.	10
East Hartford	.....	.....	.....	Own	Water Works Equipment Co.	8
Middletown	.....	.....	.....	Own	.....	6
New London	.....	.....	.....	Own	Smith	6
So. Manchester	.....	.....	.....	Own	No. 2 Smith	12
Southington	.....	Scraper and team	.....	Rent	Water Works Equipment Co.	8
Suffield	.....	.....	.....	Rent	.....	6
Wallingford	.....	.....	.....	Own	Water Works Equipment Co.	10
Georgia:						
Atlanta	.....	.....	Air compressor	Rent	A. P. Smith	20
Thomasville	.....	Drag shovel	.....	....	.....	..
Tifton	.....	Road machine	.....	....	.....	..
Illinois:						
Bloomington	.....	.....	.....	Own	Smith	6
Champaign	.....	.....	.....	Own	Smith	8
Downers Grove	Contract	.....	.....	....	.....	..
Freeport	Trench machine	Tamper	.....	Own	Smith	8
Lake Forest	Hire Austin machine	.....	.....	....	.....	..
Peru	.....	.....	.....	Own	Smith & Mueller	12
Quincy	.....	.....	.....	Own	Smith No. 1	8
Rock Island	.....	.....	.....	Own	Smith	10
Indiana:						
Bedford	.....	.....	.....	Rent	Smith	6
La Porte	.....	Scraper and horse	.....	....	.....	..
Lebanon	.....	.....	.....	Rent	Smith	4
No. Manchester	Ditching machine	Scraper and horse	.....	....	.....	..
Terre Haute	.....	Scraper and team	.....	Own	Smith	20
Iowa:						
Boone	.....	.....	.....	Own	Smith	8
Burlington	Parsons ditching machine and steam drills	Scraper with 2 horses	.....	....	.....	..
Cedar Rapids	.....	.....	.....	Own	Smith	6
Creston	.....	.....	.....	Rent	Smith	8
Maquoketa	.....	.....	.....	Own	Mueller	10
Sioux City	.....	.....	.....	Own	Smith	12
Vinton	Trench machine on big jobs	Backfill with teams	.....	....	.....	..
Kansas:						
Fredonia	.....	Backfiller	.....	Rent	Mueller	8
Independence	.....	Power tamper	.....	....	.....	..
Manhattan	.....	Slip and team	.....	....	.....	..
Topeka	.....	.....	.....	Own	Smith	6
Wellington	.....	Scraper and team	Contractor used air hammer	....	.....	..
Kentucky:						
Louisville	.....	.....	.....	Own	Smith	30
Maine:						
Augusta	.....	.....	.....	Own	Smith	8
Maryland:						
Baltimore	Parson's excavator	.....	Pneumatic caulkers	Own	Smith	36
Massachusetts:						
Adams	.....	.....	.....	Own	Smith	6
Belmont	.....	.....	.....	Own	Water Works Equipment Co.	8
Cambridge	.....	.....	.....	Own	Smith	12
Cherry Valley	.....	.....	.....	Rent	Mueller	6
Danvers	.....	.....	.....	Own	Water Works Equipment Co.	12
Fitchburg	.....	.....	.....	Own	Smith	8
Framingham	.....	.....	.....	Own	Smith	8
Haverhill	.....	.....	.....	Own	Smith	8
Millbury	.....	.....	.....	Rent	Smith	8
No Adams	.....	.....	.....	Own (a)	.....	6
Northampton	.....	.....	.....	Own	2 Smiths	10
Reading	.....	.....	.....	Own	Water Works Equipment Co.	8
Saugus	.....	.....	Compressed air	....	.....	..
Springfield	.....	.....	.....	Own	Smith	30
Taunton	.....	.....	.....	Own	Smith	8

Waltham	.....	.....	.....	Own	Van Winkle	8
Weymouth	Air drills	Horse scraper	.....	Own	Water Works Equipment Co.	8
Michigan:						
Battle Creek	For deep trenches, 4-leg derricks and 2-yd. cars	Gasoline power tamper; flat scrapers	.....	Own	Smith	8
Big Rapids	.....	Scraper and horse	.....	Own	Mueller	10
Coldwater	.....	Scraper and motor	.....	....	.....	..
Highland Park	.....	.....	Air hammer	Own	Mueller	8
Houghton	.....	.....	.....	Own	Mueller	6
Jackson	Trenching machine on large jobs	Scrapers and 3½-ton truck	Air hammer on large sizes	Own	Mueller	6
Marquette	.....	.....	.....	Own	Mueller	8
Mt. Clemens	Parson's excavator	.....	.....	Own	Smith	6
Muskegon	.....	.....	.....	Own	Smith	12
Petoskey	.....	Scraper and team	.....	....	.....	..
So. Haven	Parson's excavator	Scraper and team	.....	....	.....	..
Traverse City	.....	.....	.....	Own	Smith	6
Ypsilanti	.....	.....	.....	Own	Smith	8
Minnesota:						
St. Paul	.....	.....	.....	Own	Smith	6
Missouri:						
Trenton	.....	Teams	.....	....	.....	..
Montana:						
Billings	.....	.....	.....	Own	Smith	8
Bozeman	Austin trenching machine	"Double Quick"	.....	....	.....	..
Kalispell	.....	Scraper and horse	.....	....	.....	..
Nebraska:						
Aurora	.....	Scraper and team	.....	....	.....	..
Hastings	.....	.....	.....	Own	Water Works Equipment Co.	8
Omaha	Buckeye Trenching machine	.....	.....	Own	Smith	12
New Hampshire:						
Berlin	Air drills	.....	.....	....	.....	..
Concord	.....	.....	.....	Own	Smith	8
New Jersey:						
Atlantic City	.....	.....	.....	Own	Smith and Mueller	12(b)
Bridgeton	.....	.....	.....	Own	Smith	10
Dover	.....	.....	.....	Own	Van Winkle	10
Irvington	.....	.....	.....	Own	Smith	8
Newton	.....	.....	.....	Own	.....	6
Pleasantville	.....	.....	.....	Own	Smith	10
Princeton	.....	.....	.....	Own	Mueller	8
Rahway	.....	.....	.....	Own	Mueller	..
New Mexico:						
Raton	.....	Road grader	.....	....	.....	..
New York:						
Elmira	Rent trench machine	Scraper and teams	.....	....	.....	..
Gloversville	.....	.....	Portable air compressor	....	.....	..
Hoosick Falls	.....	.....	.....	Own	Mueller	..
Homer	.....	.....	.....	Rent	Smith	6
Jamestown	.....	.....	.....	Own	Smith	16
Kingston	.....	.....	Compressed air	Own	Smith	8
Lancaster	.....	.....	.....	Rent	Mueller	6
Mt. Vernon	.....	.....	.....	Rent	Smith	12
Newburgh	.....	.....	.....	Own	Smith	6
Olean	.....	.....	.....	Own	Smith	8
Ossining	.....	.....	.....	Rent	Water Works Equipment Co.	8
Solvay	.....	.....	.....	Rent	Smith	8
Spring Valley	.....	.....	"Ideal" compressor	Own	Smith	20
Tarrytown	.....	.....	.....	Rent	Water Works Equipment Co.	20
Waterloo	.....	.....	.....	Own	Mueller	6
Waverly	.....	.....	.....	Rent	Smith	8
North Carolina:						
Charlotte	.....	.....	.....	Own	Mueller and Smith	6
High Point	.....	.....	.....	Own	Smith	6
Raleigh	.....	.....	.....	Own	Smith	6
North Dakota:						
Devil's Lake	.....	Scraper and team	.....	....	.....	..
Ohio:						
Cincinnati	Contract	.....	.....	Own	Smith	6
Cleveland	Trenching machine by contractor	Backfilling machine by contractor	.....	Own	Smith	24
Conneaut	.....	Scraper and horses	.....	....	.....	..
Dayton	Austin excavator	Waterloo "Double Quick" backfiller	Delaware air compressors and Dayton pneumatic hammers	Own	Smith	12
Kent	Trenching machine by contract	.....	.....	....	.....	..
Lima	.....	.....	.....	Own	Smith	6
Marietta	.....	.....	.....	Own	Home-made	6
Painesville	.....	.....	.....	Own	.....	12

For footnote, see page 368.

APPLIANCES USED IN WATER WORKS OPERATION (Continued).

City and state	Labor-Saving Mechanical Appliances Used: Excavating trenches	Backfilling or tamping trenches	Caulking pipe	Machines for Inserting Branches in Mains: Owned or rented	Kind used	Largest size of branch inserted, inches
Ohio (Continued):						
Tiffin	Buckeye ditcher	.....	Air compressor	Own	Smith	8
Toledo	.....	.....	.....	Own	Smith	8
Urbana	.....	.....	.....	Own	Mueller	6
Wapakoneta	Trenching machine	Team	.....	Rent	.....	6
Xenia	.....	.....	.....	Rent	Smith	12
Oklahoma:						
Stillwater	.....	.....	.....	Rent	.....	6
Oregon:						
Hood River	.....	.....	.....	Rent	.....	4
Pennsylvania:						
Carbondale	.....	.....	.....	Own	Smith	12
Catasauqua	.....	.....	.....	....	.....	..
Lancaster	Air drill	.....	Air compressor	....	.....	..
Meadville	.....	.....	.....	Own	Smith	8
Media	.....	.....	.....	Own	Smith	6
New Castle	Plow and scraper	Team	.....	Own	Smith	12
Oil City	.....	.....	.....	Own	Smith	8
Rhode Island:						
Woonsocket	.....	.....	.....	Own	Smith	8
South Carolina:						
Florence	Plow and mule team	Drag scraper and team	.....	....	.....	..
South Dakota:						
Mitchel	Rent ditching machine	Scrapers and teams	.....	....	.....	..
Rapid City	.....	Horse scraper	.....	....	.....	..
Tennessee:						
Memphis	.....	.....	.....	Own	Smith	12
Texas:						
Abilene	.....	Scraper and long chain	.....	Own	Smith	6
Galveston	.....	.....	.....	....	.....	..
McKinney	.....	Scraper and teams	.....	....	.....	..
Utah:						
Salt Lake	.....	.....	.....	Own	Smith	12
Vermont:						
Bennington	.....	.....	.....	Rent	Payne	12
Virginia:						
Charlottesville	.....	.....	.....	Own	Mueller and Smith	8
Wisconsin:						
Fond du Lac	Gasoline trench pump	.....	.....	Own	Smith	8
Green Bay	.....	.....	.....	Own	Smith	8
Janesville	.....	Scraper and team	.....	....	Smith	18
Milwaukee	Contract	.....	.....	Own	Mueller and Smith	8
Whitewater	.....	.....	.....	Rent	Mueller	4
Wyoming:						
Rock Springs	Ditching machine	Teams	.....	Own	Mueller	8
Canada:						
Toronto, Ont	.....	.....	.....	Own	Smith	20
Winnipeg, Man	.....	Scrapers and team	.....	Own	Smith	8

a—Rent machine for larger sizes; b—Rent larger sizes up to 20 inch.

FREEZING AND THAWING. VALVE INSPECTION.

City and State.	How often do you inspect street valves?	Of what does such inspection consist?	Trouble with hydrants freezing last winter?	Method of thawing.	Did mains freeze last winter?	At what Depth?	Method of thawing	Did you thaw frozen Services?	Method of thawing.
Alabama:									
Gadsden	6 months	.....	No	.....	No	....	.....	No	.....
Talladega	Not regularly	See if leaking	No	.....	No	....	.....	No	.....
Arizona:									
Nogales	Yearly	Open and close	No	.....	No	....	.....	No	.....
Arkansas:									
Eldorado	Not regularly	.....	No	.....	No	....	.....	Yes	Blow torch
California:									
Anaheim	Yearly	Open and close	...	.....	...	....	.....	....	.....
Glendale	Not regularly	.....	No	.....	No	....	.....	No	.....
Los Angeles	Continuously	.....	No	.....	No	....	.....	No	.....
Oxnard	Semi annually or oftener	Open and close	No	.....	No	....	.....	No	.....
Pacific Grove	.....	Open and close	No	.....	No	....	.....	No	.....
Redlands	Yearly or oftener	Repacking and oiling	No	.....	No	....	.....	No	.....
Riverside	Once a month	Open and close, inspect packing	No	.....	No	....	.....	No	.....
Santa Maria	Every 4 months	.....	No	.....	No	....	.....	No	.....
Stockton	Annually	General	No	.....	No	....	.....	No	.....

Colorado:									
Colorado Springs..	Annually	Open and close	No	.....	No	....	.....	No	Consumers hire plumbers
Longmont	Not regularly	Open and close	No	.....	No	....	.....	No	.....
Connecticut:									
Ansonia	Not regularly	Repacking	Yes	Steam	Yes	3 or 4 ft.	Electricity	Yes	Hot water and steam
Bristol	Not regularly	.....	Yes	Steam	No	....	.....	Yes	Electricity and steam
East Hartford.....	Annually	Open & close, test leaks	Yes	Electricity	Yes	3½ to 5½ ft.	Electricity	Yes	Electricity
Middletown	Annually	Open and close	Yes	Exhaust steam from auto trucks	Yes	3 ft.	Electricity	Yes	Electricity
New London	Annually	.....	A few	Hot water and salt	Little	4 ft.	Hot water injector and electricity	Yes	Injector and electricity
South Manchester..	None	.....	Yes	Hot water	Yes	6 ft.	Electricity & digging	Yes	Electricity
Southington	Every 6 months	Inspecting valve boxes, stuffing boxes, open & close valves	No	.....	No	....	.....	Yes	Hot water and force pump
Suffield	None	.....	No	.....	Some	4 ft.	Electricity	Yes	Electricity
Wallingford	Annually	Open and close	Yes	Steam	Yes	4.5 ft.(a)	Electricity	Yes	Electricity and hot water
Willimantic	.....	.....	Yes	Electricity	Yes	4½ to 5 ft.	Electricity	Yes	Electricity
Windsor Fire Dist.	Annually	Open and close	Yes	Pumped hot water into barrel	No	....	.....	Yes	Hot water & electricity
Florida:									
Daytona	Twice a year	Open & close, valve box	No	.....	No	....	.....	No	.....
De Land	Monthly	.....	No	.....	No	....	.....	No	.....
St. Augustine.....	Every 90 days	Open and close	No	.....	No	....	.....	No	.....
Georgia:									
Americus	Semi annually	Determine if open	No	.....	No	....	.....	No	.....
Atlanta	Annually	Open and close	No	.....	No	....	.....	No	.....
La Grange.....	Annually	Open and close	No	.....	No	....	.....	No	.....
Milledgeville	Semi annually	Cleaning	No	.....	No	....	.....	No	.....
Thomasville	Annually	Open, close and oil	No	.....	No	....	.....	No	.....
Tifton	Quarterly	Open and close	No	.....	No	....	.....	No	.....
Waynesboro	Semi annually	Cleaning	No	.....	No	....	.....	No	.....
Idaho:									
Boise	Annually	Open and close	No	.....	No	....	.....	No	.....
Lewiston	.....	.....	No	.....	No	....	.....	Yes	Electricity
Twin Falls.....	Monthly	Open and close	No	.....	1916	3½ ft.	Electricity	Some	.....
Weiser	Annually	General condition	No	.....	No	....	.....	No	.....
Illinois:									
Bloomington	Semi annually	Open and close	No	.....	No	....	.....	No	.....
Champaign	Annually	Open and close	Few	Repack stuffing box	No	4 ft.	.....	Yes	Gasoline-driven generator
Downers Grove...	Not regularly	.....	....	.....	..	....	.....	No	Dug up those burst
Flora	Every 4 months	Open and closed	No	.....	Yes	8 feet(b)	.....	No	.....
Freeport	Annually	See if working	No	.....	No	....	.....	No	.....
Lake Forest.....	Annually	Open and close	One	Used fire	No	....	.....	Yes	Electricity
Marshall	Annually	Open and close	Yes	Dug them up	No	....	.....	Yes	Dug up
Mendota	Annually	Cleaning and oiling	No	.....	No	....	.....	....	Plumbers do it.
Mt. Vernon	Annually	Open and close, inspect for leaks	No[m]	.....	Yes	3	Electricity	Yes	Electricity
Paris	.....	.....	Very little	.....	No	....	.....	Yes	Dug up
Peru	When flushing hydrants	.....	No	.....	No	....	.....	Yes	Electricity
Quincy	Not regularly	.....	No	.....	No	....	.....	No	.....
Rock Island.....	When out of order	.....	No	.....	No	....	.....	Yes	Electricity
Watseka	Twice a year	Test tightness by clos'g	No	.....	No	....	.....	Yes	Electricity
Indiana:									
Bedford	.....	.....	No	.....	No	....	.....	Yes	Electricity
Brookville	When sh'ting off press.	.....	Three	With fire	No	....	.....	No	.....
Delphi	Not at all	.....	No	.....	No	....	.....	No	.....
Elwood	Annually	Open and close	Yes	Build fire around	No	....	.....	No	.....
Fort Wayne.....	2 or 3 times a year	Open and close	No	.....	Yes	4½ ft.	Electricity	Yes	Electricity
Goshen	Annually	Open and close	Some	Steam from traction engine	Yes	4½	Steam from traction engine	No	.....
Knightstown	Never	.....	No	.....	No	....	.....	No	.....
La Porte.....	Annually	Test tightness by clos'g	No	Steam	No	....	.....	No	Steam or electricity
Lebanon	Annually	Oil, open and close	No	.....	Yes	3 ft.	Electricity	Yes	Electricity
Linton	.....	.....	Slight(c)	.....	No	....	.....	One	.....
Mishawaka	Annually	.....	Two	Electricity	No	....	.....	Yes	Electricity
No. Manchester ...	Annually or oftener	Examining and testing	Yes	Steam or fire	No	....	.....	A few	Syphoned hot water
Peru	Annually	Testing	No	.....	No	....	.....	Yes	Steam
Plymouth	4 times a year	Open and close	No	.....	No	....	.....	No	.....
Terre Haute	Once in 2 years	Open and close	Yes	Hot water	No	....	.....	Yes	Hot water or steam through ¼-in. block tin pipe
Tipton	Annually	Inspect packing	No	.....	No	....	.....	No	.....
Vincennes	Annually	Packing and tightness	No	.....	No	....	.....	Yes	Electricity

For footnote, see page 374.

FREEZING AND THAWING. VALVE INSPECTION (Continued).

City and State.	How often do you inspect street valves?	Of what does such inspection consist?	Trouble with hydrants freezing last winter?	Method of thawing.	Did mains freeze last winter?	At what Depth?	Method of thawing	Did you thaw frozen Services?	Method of thawing.
Iowa:									
Boone	Semi-annually	Clean valve boxes	Yes	Steam	Yes	5 ft.	Steam and electricity	Yes	Electricity
Burlington	Annually	Open and close	No	.....	No	....	.....	No	.....
Cedar Falls	Annually	.....	No	.....	No	....	.....	Yes	Electricity
Cedar Rapids	.....	.....	Yes	Steam	No	....	.....	No	.....
Creston	Annually	Test	No	.....	No	....	.....	Yes	Electricity
Fort Madison	.....	.....	Yes	Hot water and steam	No	....	.....	Yes	Hot Water and steam
Hawarden	Twice a year	Open and close	Yes	Steam	No	....	.....	Yes	Small steam boiler
Maquoketa	Twice a year	Test tightness	No	.....	No	....	.....	No	Done by plumbers
Sioux City	Annually	.....	Very little	With Salt	Two	4½ ft.	Uncov. & put fire around	No	.....
Spencer	Each fall	Test tightness & pack.	No	.....	No	....	.....	Yes	Electricity
Stanton	3 or 4 times a year	Open and close	No	.....	No	....	.....	Yes	Hot water and blow torch
Vinton	.....	.....	No	.....	No	....	.....	No	.....
Washington	Annually	.....	No	.....	No	....	.....	No	.....
Winterset	Annually	.....	No	.....	Yes	3 ft.	Let warm weather do it	Yes	Boiler and brass tubing
Kansas:									
Chanute	Annually	Open and close and oil	No	.....	Yes	1½ ft.	Electricity	Yes	Electricity
Coffeyville	Annually	Open and close	Some	Hot water	Some	2 ft.	Steam and electricity	Yes	Steam and electricity
Council Grove	Frequently	Open and close	No	.....	No	....	.....	No	.....
Emporia	Not systematically	.....	Yes	Warm weather did it	Yes	2 ft.	Dug up and used torch	No	Plumbers do it
Fredonia	Annually	Op., close, inspect pack'g	No	.....	No	....	.....	No	.....
Great Bend	Twice a year	Open and close	Some	Electricity	No	....	.....	Yes	Electricity
Hiawatha	Not regularly	.....	No	.....	No	....	.....	No	.....
Horton	Quarterly	Open & close, inspect packing	No	.....	Yes	2½ ft.	Didn't	Yes	Dug up
Independence	Not regularly	.....	Yes	Fire or steam	Yes	2½ ft.	Warm weather did it	Yes	Steam or dug up
Larned	Twice a year	Open & close, inspect packing	No	.....	Yes	1 ft.	Electricity	Yes	Electricity
Manhattan	Annually	Repack and inspect	Yes	Used salt	No	....	.....	No	.....
McPherson	Annually	Open and close	No	.....	No	....	.....	Yes	Electricity
Neodesha	Annually	Open & close, inspect packing	No	.....	...	....	.....	...	.....
Newton	When required	.....	No	.....	A few	2 ft.	Warm weather did it	No	.....
Osage City	Twice a year	.....	No	.....	No	....	.....	Yes	Electricity
Osawatomie	.....	Open & close	No	.....	No	....	.....	No	.....
Topeka	Annually	Open & close, clean boxes	Yes	Fire around them	No	....	.....	A few	Steam
Wellington	Annually	Open & close, test tightness	No	.....	Yes	2 ft.	Electricity	Yes	Electricity
Kentucky:									
Hopkinsville	2 or 3 times a year	Repacking	No	.....	Some	2½ ft.	Blow torches	Yes	Blow torches
Lexington	Semi-annually	Open and close	No	.....	No	....	.....	Yes	Electricity
Louisville	Annually	Open & close	No	.....	No	....	.....	Yes	Large, elec., small, hot water
Paris	Annually	Open & close, test tightness	Some	Used fire	No	....	.....	No	.....
Richmond	Not regularly	Open & close	No[d]	.....	No	....	.....	Yes	Electricity
Shelbyville	Frequently	General	No	.....	No	....	.....	Yes	Electricity
Louisiana:									
Ruston	Twice a year	.....	No	.....	No	....	.....	No	Plumbers do it
Maine:									
Augusta	Annually	Open & close	No	.....	No	....	.....	2	Thawing tube
Calais	When used	.....	No	.....	No	....	.....	Yes	Hot water & thawing tube
Farmington	Annually	Locate	No	.....	No	....	.....	Yes	Hot water
Ft. Kent	Not at all	.....	No	.....	No	....	.....	No	.....
Norway	Annually	.....	No	.....	No	....	Electricity	Yes	Electricity
Van Buren	Annually	Repack, inspect bolts	Yes	Hot water, pump and tin pipe	No	....	.....	No	.....
Sanford	Twice a year	.....	Yes	Hot water	Yes	5 ft.	Electricity	Yes	Hot water
Maryland:									
Baltimore	When operated[e]	.....	Yes	Flame torch	Yes	3 to 6 ft.	Direct flame	Yes	Elec., portable generator
Massachusetts:									
Adams	Annually	Open & close	No	.....	One	4½ ft.	Charcoal and electricity	Yes	Block tin pipe
Athol	.....	.....	Yes	.....	Yes	6 ft.	Electricity	Yes	Electricity
Barre	Twice a year	Flushing	No	.....	...	....	.....	...	.....
Belmont	Annually	Open & close, inspect packing	Yes	Electricity and thaw pump	Yes	5 ft.	Electricity	Yes	Electricity & thaw pump
Cambridge	Annually	Open & close	Yes	Hot water	Four	1½ ft.	Elec., pump & hot water	Yes	Electricity & hot water
Cherry Valley	Spring and Fall	Inspect boxes	No	.....	No	....	.....	Yes	Steam and hot water
Danvers	Frequently	Open & close	Yes	Steam & electricity	Yes	5 ft.	Electricity	Yes	Hot water & electricity
Falmouth	Annually	Open & close	No	.....	Yes	4 ft.	Electricity	Yes	Electricity
Fitchburg	Annually	.....	Yes	Steam	Some	5 ft.	Electricity	Yes	Hot water & electricity
Franklin	Annually	Open and close	One	Did not thaw	Yes	5	Waited for hot weather	Yes	Electricity and tube
Framingham	.....	.....	Yes	Steam	Yes	5 ft.	Electricity	Yes	Hot water & electricity
Haverhill	Annually	Open & close	Yes	Electricity	Yes	6 ft.	Electricity	Yes	Electricity
Lenox	When leaking	.....	No	.....	No	....	.....	No	.....

Mansfield	Twice a year	Open & close	Some	Electricity	No	....	.....	Yes	Electricity
Medway	Annually	Open & close	No	.....	Yes	4½ ft.	Didn't	Yes	Hot water & block tin pipe
Millbury	Not regularly	Open & close, clean box's	No	.....	Yes	5 ft.	Electricity	Yes	Electricity, and pump with block tin pipe
Monson	.....	.....	No	.....	No	....	.....	No	.....
North Adams	When necessary	Test tightness	Yes	Hot water or elec'y.	Yes	6½ ft.	Electricity	Yes	Electricity or hot water
Northampton	Twice a year	Open & close, and oil	Yes	Steam boiler or pipe	Yes	5 ft.	Steam boiler and pipe	Yes	Burbank thawing machine
Orange	Annually	Open and close	No	.....	No	....	.....	Yes	Electricity
Reading	Not regularly	.....	No	.....	Yes	4½ ft.	Electricity	Yes	Electricity
Saugus	.....	.....	Yes	Electricity	Yes	4½ ft.	Electricity—Hauck thawing machine	Yes	Electricity and hot water
Spencer	Twice a year	Inspect packing, clean boxes	No	.....	Three	4 ft.	Didn't	No	Owners do it
Springfield	Once or twice a year	Open and close	A few	Hot water	No	....	.....	Yes	Electricity and hot water
Taunton	Annually	Open and close	Branches	Electricity	A few	5 ft.	Electricity	Yes	Electricity and hot water
Turners Falls	Semi-annually	Open and close	Yes	Electricity	Yes	5	Electricity	Yes	Forced hot water into service
Walpole	Annually	Open and close, and oil	Yes	Electricity	Yes	4½ ft.	Electricity	Yes	Electricity and hot water
Waltham	Twice a year	Open and close	Yes	Steam or hot water	Yes	3½ to 5 ft.	Steam or electricity	Yes	Hot water or electricity
Wellesley	When used	Open and close	Some	Electricity	Some	6 ft.	Electricity	Yes	Electricity and hot water
Weymouth	Annually	Open and close	Yes	Hot water or electricity	Yes	5 ft.	Electricity	Yes	Hot water
Michigan:									
Albion	.....	.....	Two	Loosened caps, let them thaw naturally	Two	4 to 5 ft.	Didn't	Yes	Steam and tube
Alma	Often	Test for tightness	No	Steamer	No	....	.....	Yes	Electricity
Battle Creek	Once or twice a year	Open and close	Little	Small steam boiler	No	....	.....	Yes	Electricity
Big Rapids	Twice a year	Test for leakage	Slight	Steam boiler on sled	No	....	.....	Yes	Electricity
Coldwater	Not regularly	.....	No	.....	Yes	5½ ft.	Electricity	Yes	Electricity
Crystal Falls	Twice a year	.....	Yes	Electricity and steam	Yes	7 ft.	Electricity	Yes	Electricity
Grand Rapids	Annually	.....	Yes	Boiler on auto	No	....	.....	No	Done by electrical co.
Hastings	Annually	Test for leaks, repack	No	.....	No	....	.....	No	.....
Highland Park	Annually	Open and close	Yes	Use salt	No	....	.....	No	Done by light co.
Houghton	Monthly	Test for leakage	No	.....	One	5 ft.	Electricity	Yes	Electricity
Iron Mountain	Twice a year	Open and close	Some	Electricity	Some	7 ft.	Electricity	Yes	Electricity
Ishpeming	Annually	Open and close	No	.....	No	....	.....	Yes	.....
Jackson	Annually	General inspection	Some	Steam	Yes	3 to 5½ ft.	Steam and electricity	Yes	Steam and electricity
Manistee	Semi-annually	Open and close	No	.....	No	....	.....	Yes	Steam
Marquette	Annually	Open and close	No	.....	No	....	.....	Yes	Electricity
Mt. Clemens	Annually	Open and close	One	Steam	One	5½ ft.	Didn't	No	.....
Muskegon	When necessary	Open and close	Few	.....	No	....	.....	No	.....
Paw Paw	Twice a year	Open and close	No	.....	No	....	.....	No	.....
Petoskey	Annually	Trying out	Slight	Steam	No	....	.....	Yes	Steam
South Haven	Spring and Fall	Open and close, test tightness	No	.....	No	....	.....	Yes	Electricity
Traverse City	Annually	Open and close	Yes	Hot water	No	....	.....	Yes	Electricity
Yale	When defect suspected	.....	Two	Salt and alcohol	No	....	.....	Four	Electricity
Ysilanti	Annually	Open and close	Yes	Hot water	Yes	5 ft.	Electricity	Yes	Electricity
Minnesota:									
Eveleth	Annually	Valve and box	Slight	Small steamer	No	....	.....	Yes	Electricity
Fairmont	Annually	Test for leaks	No	.....	No	....	.....	No	.....
Lake City	Annually	Open and close	Yes	Steam hose	No	....	.....	Yes	Steamer
Moorhead	When they give trouble	.....	Yes	Steam	No	....	.....	Yes	Electricity
St. Paul	Spring and Fall	Open and close; listen for leaks	Yes	Steam	Yes	7½ ft.	Apply heat	Yes	Electricity
Willmar	.....	.....	No	.....	Yes	6 ft.	Electricity	Yes	Electricity
Mississippi:									
Water Valley	.....	.....	No	.....	Some	10 in.	Uncovered and built fire	Some	Uncovered and built fire
Missouri:									
Albany	4 times a year	Open and close	No	.....	One	3 ft.[b]	Didn't	No	.....
Boonville	When something wrong	.....	No	.....	Yes	2 to 3 ft.	Dug up and flushed with water	No	Plumbers do it
Carrollton	Annually	Repack and examine	No[f]	.....	No	....	.....	No	.....
Farmington	.....	.....	....	.....	..	....	.....	Yes	Electricity or digging up
Fulton	Semi-annually	Open and close	No	.....	No	....	.....	No	Plumbers used torch
Trenton	Always watching	Open and close	No	.....	No	....	.....	No	Plumbers do it
West Plains	Annually	Open and close	One	Built fire around	No	....	.....	No	.....
Montana:									
Billings	Annually	Open and close	Yes	Steam	No	....	.....	One	Dug up
Bozeman	Quarterly	Open and close	No	.....	No	....	.....	No	.....
Helena	Annually	Open and close	Yes	Electricity	No	....	.....	No	.....
Kalispell	Twice a year	Open and close	No	.....	No	....	.....	Yes	Electricity
Libby	Annually	Complete	No	.....	No	....	.....	Yes	Electricity
Livingston	Annually	Pack and general	No	.....	No	....	.....	No	.....
Nebraska:									
Alliance	Annually	Open and close	No	.....	Yes	4½ ft.	Electricity	Yes	Electricity
Aurora	When used	.....	Yes	Didn't	Yes	2 to 4 ft.	Dug up and used fire, or electricity	Some	Same as mains

For footnote, see page 374.

FREEZING AND THAWING. VALVE INSPECTION (Continued).

City and State.	How often do you inspect street valves?	Of what does such inspection consist?	Trouble with hydrants freezing last winter?	Method of thawing.	Did mains freeze last winter?	At what Depth?	Method of thawing	Did you thaw frozen Services?	Method of thawing.
Nebraska (Cont.):									
Grand Island	Annually	Open and close	No	.....	No	....	.....	No	.....
Hastings	Annually	Open and close	No	.....	No	....	.....	No	.....
Omaha	Annually and triennially	Open and close	Yes	Steam from portable boiler	No	....	.....	No	Plumbers do it
Schuyler	Annually	Open and close	A few	Salt and hot water	No	....	.....	No	.....
New Hampshire:									
Berlin	Biennially, some oftener	.....	Yes	Hot water	No	....	.....	Yes	Electricity and Burbank machine
Claremont	2 or 3 years	Open and close, clean boxes	No	.....	No	....	.....	Seven	Hot water
Concord	Triennially	Open and close	Yes	Steam boiler, also exhaust from truck	No	....	.....	Yes	Electricity, hot water and block tin pipe
Dover	.....	.....	Yes	Hot water	No	....	.....	Yes	Hot water and pipe
Franklin	Not regularly	.....	No	.....	No	....	.....	Yes	Electricity
Lebanon	When needed	.....	One	Burst before discovered	No	....	.....	Yes	Electricity
Milford	Frequently	Open and close	A little	Steam or hot water	One	5 ft.	Didn't	Yes	Hot water and pipe
Newport	When necessary	.....	No	.....	No	....	.....	Three	Poured in hot water
Rochester	Annually	.....	Yes	Steam	No	....	.....	Yes	Hot water
New Jersey:									
Atlantic City	Not regularly	.....	Some	Steam from fire engine	Slight	2 ft.	Steam jet throuh corporation cock	Yes	Steam jet
Bridgeton	Semi-annually	Open and close	A little	Steam	Yes	3½ ft.	Let nature do it	Yes	Electricity
Dover	Annually	Open and close	No	.....	No	....	.....	Yes	Electricity
Hawthorne	Annually	Open and close, test for leakage	No	.....	No	....	.....	Yes	Hot water through small pipe
Helmetta	.....	.....	No	.....	Yes	3½	Steam[a]	Yes	Same as mains
Irvington	Annually	Open and close	No	.....	No	....	.....	Yes	Steam
Jamesburg	Annually	Open and close	Three	.....	..	....	.....	Yes	Steam
Milltown	Twice a year	Open and close	No	.....	No	....	.....	No	Plumbers insert steam pipe
Newton	Every 4 months	Open and close	No	.....	No	....	.....	Yes	Electricity
Nutley	Biennially	Open and close	A little	.....	No	....	.....	Yes	Portable steam boiler
Pleasantville	Annually	Open and close	Yes	Built fire around	Yes	4½	Electricity—unsuccesful	Yes	Electricity
Princeton	Do not	.....	No	.....	No	....	.....	No	.....
Rahway	Twice a year	Testing	No	.....	No	....	.....	No	.....
New Mexico:									
East Las Vegas	When used	.....	No	.....	No	....	.....	No	.....
Raton	Annually	Open and close	No	.....	No	....	.....	No	.....
New York:									
Amityville	When necessary	Open and close	Yes	Steam	Yes	4 ft.	Electricity	Yes	Electricity
Dansville	Twice a year	General	Yes	Steam & electricity	Yes	4 to 6 ft.	Electricity	Some	Steam and electric light co.
Elmira	.....	.....	Two	Electricity	Yes	5 ft.	Electricity	No	Privately, by electricity
Glens Falls	Annually	Open and close	Yes	Steam	No	....	.....	Yes	Hot water and electricity
Gloversville	Annually	Testing and packing	Yes	Salt, wood-alcohol, electricity	No	....	.....	Yes	Electricity
Hoosick Falls	Twice a year	Open and close	Yes	Steam	One	5 ft.	Electricity	Yes	Electricity
Homer	.....	.....	No	.....	No	....	.....	No	.....
Jamestown	Annually	Open and close	No	.....	Yes	4 to 5 ft.	Electricity	Yes	Electricity
Kingston	Occasionally	Test by sections	Yes	Steam	Some	5½	Electricity	No	.....
Lancaster	Annually	Open and close	Yes	Steam	No	....	.....	Yes	Electricity
Mechanicsville	Twice a year	Open and close	Yes	Steam	No	....	.....	No	.....
Mount Morris	New plant	.....	No	.....	Yes	4½ ft.	Some still frozen	Yes	Electricity
Mt. Vernon	At least once a year	Open and close	Very little	By steam	Yes	3 or 4 ft.	Electricity	Yes	Electricity
Newburgh	Semi-annually	Open and close	Yes	Steam & electricity	Yes	4 ft.	Steam and Electricity	Yes	Electricity
Orleans	Not regularly	.....	No	.....	No	....	.....	Yes	Electricity
Oneonta	Annually	Open and close	Yes	Steam	Yes	5 ft.	Cut out section and used steam	..	Electricity
Ossining	Annually	Open and close	Some	Steam	One	4 ft.[b]	Electricity	Yes	Electricity, steam, torch
Oswego	Once a month	Test tightness	Yes	Electricity	Yes	4 ft.	Electricity	Yes	Electricity
Peekskill	When necessary	.....	No	.....	One	1½ ft.	Electricity	No	Consumers do it
Seneca Falls	Not regularly	.....	No	.....	No	....	.....	Yes	Steam
Sidney	Annually	Open and close	Yes	.....	One	5½ ft.	Uncovered and used fire	No	Plumbers use steam
Solvay	Twice a year	Test tightness	No	.....	No	....	.....	Yes	Electricity
Spring Valley	When required	Remove bonnet	No	Used salt	No	....	.....	No	Plumbers do it
Tarrytown	Annually	Open and close	One	Keronese torch	One	2½ ft.[g]	Electricity	Yes	Electricity
Tonawanda	Annually	.....	Yes	Steam	No	....	.....	Yes	Steam
Waterloo	Annually	Open and close	Some	By fire	No	....	.....	Yes	Steam or electricity
Waverly	Annually	Open and close	Very little	.....	No	....	.....	Yes	Electricity
North Carolina:									
Charlotte	Irregular intervals	.....	No	.....	No	....	.....	Yes	Fires and torch
High Point	No inspection	.....	One[h]	By fire around it	No	....	.....	Yes	Digging or electricity
Lenoir	Annually	Stem and packing	Yes	Burning oil	No	....	.....	Yes[i]	.....
Newbern	When used	General	Yes	Steam or oily waste	No	....	.....	No	.....

Raleigh	Annually	Open and close	No	.....	No	....	.....	No	.....
Rocky Mount	Annually	Open and close	No	.....	No	....	.....	Some	Kerosene torch
Statesville	Annually	Open and close	Yes	Oil and waste	No	....	.....	Yes	Dig up
North Dakota:									
Devil's Lake	Semi-annually	Open and close	No	.....	No	....	.....	No	.....
Grand Forks	When out of order	.....	No	Steam	No	....	.....	No	.....
Wahpeton	Semi-annually	Open and close	No	.....	No	....	.....	No	.....
Ohio:									
Bryan	.....	.....	Some	Truck exhaust through hose into hydrant	No	....	.....	No	.....
Celina	Annually	Open and close	No	.....	No	....	.....	No	.....
Cincinnati	Annually	Open and close, test for leaks	Yes	Steam	Yes	3 ft.	Fire	No	Consumers do it
Cleveland	Not regularly	.....	Some	Steam from fire engines	No	....	Yes	Yes	Electricity
Conneaut	Annually	Open and close	No	.....	No	....	.....	Yes	Electricity and hot water
Coshocton	Annually	Test for leaks	No	.....	No	....	.....	No	.....
Dayton	When men available	Test by districts	Three	.....	A little	4½ to 5 ft.	Electricity	Eight	Electricity
Defiance	Annually	Open and close	No	.....	Yes	3½ ft.	Steam	Yes	Steam
Eaton	4 times a year	Open and close	No	.....	No	....	.....	No	.....
Franklin	.....	.....	No	.....	No	....	.....	No	.....
Gibsonburg	Twice a year	Test tightness	No	.....	No	....	.....	No	.....
Kent	Annually	Open and close	No	.....	Yes	4 ft.	Electricity	Yes	Electricity
Lima	When used	.....	Yes	Fire around it	No	....	.....	Yes	Steamer and hose
Marietta	Twice a year	Open and close	Yes	Buckeye heater	Yes	2½ to 3 ft.	Buckeye heater	No	Plumbers do it
Milan	Twice a year	Keep in working order	No	.....	No	....	.....	No	.....
Mt. Gilead	Annually	Open and close	No	.....	No	....	.....	No	.....
Mt. Vernon	Annually	Open and close	No	.....	No	....	.....	Yes	Steam
Painesille	Not regularly	Open and close	Yes	Electricity	No	....	.....	Yes	Electricity
St. Marys	When used	.....	Yes	Didn't	Yes	2 ft.	Fire under them	No	.....
Tiffin	Annually	Open and close	No	.....	One	4½ ft.	Electricity	No	.....
Toledo	Annually	Open and close	Yes	Clow hydraulic steamer	No	....	.....	Yes	Steamer with small hose
Troy	Twice a year	Open and close	No	.....	No	....	.....	No	.....
Urbana	When leaking	.....	Yes	Steam	Yes	3½ ft.	Electricity	No	.....
Wadsworth	Twice a year	.....	No	.....	Yes	4 ft.	Steam thawing machine	Yes	Same as mains
Wapakoneta	Annually	Box and gate	No	.....	No	....	.....	Yes	Electricity
Wauscon	Annually	Packing	Yes	With steam	No	....	.....	No	.....
Xenia	When used	.....	No	.....	No	....	.....	No	.....
Oklahoma:									
Guthrie	Twice a year	Open and close	No	.....	Yes	1½ ft.	Blow torch	Yes	Blow torch
Pawhuska	Once a year	Repacking	Yes	Wood fires	Yes	1½	Wood-fires	Yes	Wood-fires
Stillwater	Occasionally	.....	No	.....	No	....	.....	No	.....
Woodward	When needed	.....	Yes	.....	No	....	.....	No	.....
Oregon:									
Baker	Twice a year	Open and close	Yes	Electricity	Yes	3 to 4 ft.	Electricity	Yes	Electricity
Eugene	Annually	Open and close	No	.....	No	....	.....	No	.....
Hood River	Annually	Open and close	No	.....	No	....	.....	No	.....
La Grande	Semi-annually	Test tightness	No	.....	No	....	.....	No	.....
Pennsylvania:									
Ambler	Spring and Fall	Valve box clean	Some	Steam boiler & hose	Three	3 ft.	Broken, were removed	No	Consumers do it
Barnesboro	Spring and Fall	Packing	No	.....	Yes	4 ft.	Left till Spring	Yes	Steamer and hose
Carbondale	April and October	Open and close	Not much	Electricity	Not much	3 to 4 ft.	Electricity	No	Electric co. does it
Catasauqua	Annually	General	No	.....	No	....	.....	No	.....
Chambersburg	Annually	Open and close	Little	Gasoline	No	....	.....	Yes	Electricity
Clearfield	When used	Open and close	No	.....	One	4 ft.	By steam	Yes	By steam
Duquesne	Annually	Open and close	Yes	With fire	Yes	3 ft.	Dig them up	Yes	Steam boiler
E. Stroudsburg	Monthly	Open and close	Yes	Electricity	Yes	3 ft.	Electricity	Yes	Electricity
Hanover	.....	.....	No	.....	Yes	3 ft.	Abandoned	No	.....
Juniata	Frequently	Examine for leakage	Little	Hot water	No	....	.....	Yes	Electricity
Lancaster	Triennially	Leakage survey	No	.....	No	....	.....	Yes	Electricity
McDonald	4 times a year	Test	Yes	Hot water	No	....	.....	No	.....
Meadville	Not regularly	.....	No	.....	Yes	4 ft.	Steam	..	Steam
Media	Twice a year	Open and close	No	.....	Yes	3 ft.	Thawed themselves or broke	No	Consumers by electricity
Minersville	Twice a year	Open and close	No	.....	Yes	3 ft.	Pipes burst	Yes	Electricity
New Castle	Annually	Open and close	Yes	Fire around them	Yes	5 ft.	Electricity	Yes	Electricity
Oil City	Not regularly	Open and close	Yes	Hot water through pipes	Yes	2½ ft.	Didn't	Yes	Electricity
Pottsville	Annually	Open and close	No	.....	No	....	.....	No	.....
Slatington	Annually	Packing	Yes	Steam	No	....	.....	Yes	Plumbers do it
S. Brownsville	Not regularly	.....	Yes	Steam from Ford car radiator	Some	3 ft.	Electricity	Yes	Electricity
Susquehanna	Monthly	.....	Yes	Electricity	Yes	4 ft.	Electricity	Yes	Electricity
Uniontown	Annually	Open and close	Yes	Kerosene torch	Yes	2½ to 3 ft.	Dug up, used torch	No	.....
Rhode Island:									
Woonsocket	Annually	Open and close	Yes	Steam	Yes	5½	Steam and electricity	Yes	Electricity
South Carolina:									
Beaufort	Just started	.....	No	.....	No	....	.....	No	.....
Bennettsville	Twice a year	Open and close	No	.....	No	....	.....	Three	Dug up

For footnote, see page **374.**

FREEZING AND THAWING. VALVE INSPECTION (Continued).

City and State.	How often do you inspect street valves?	Of what does such inspection consist?	Trouble with hydrants freezing last winter?	Method of thawing.	Did mains freeze last winter?	At what Depth?	Method of thawing	Did you thaw frozen Services?	Method of thawing.
So. Carolina (Cont.):									
Camden	3 or 4 months	Open and close	No	.....	No	....	.....	Some	Dig up, blow torch
Darlington	Twice a year	Open and close	No	.....	No	....	.....	No	.....
Florence	Not regularly	Open and close	No	.....	Little	1 ft.	.....	No	.....
South Dakota:									
Aberdeen	Annually	Open and close	No	.....	Yes	4 ft.	Water through ¾-in. pipe	Yes	Steam hose
Mitchell	Monthly	Open and close	Two	Lime	No	....	.....	No	.....
Rapid City	Annually	Open and close	No	.....	No	....	.....	Yes	Electricity
Watertown	Semi-annually	Open and close	One	Steam	No	....	.....	No	Done by electric co.
Tennessee:									
Clarksville	Annually	Open and close	A little	Wood fire	No	....	.....	No	.....
Cleveland	Not at all	.....	No	.....	No	....	.....	No	.....
Columbia	Twice a year	Open and close	....	.....	No	....	.....	Yes	Electricity
Greeneville	Monthly	.....	No	.....	No	....	.....	No	.....
Memphis	4 times a year	Try them out	No	.....	One	3 ft.	Pipe burst	Few	Torch
Murfreesboro	Annually	Open and close	No	.....	No	....	.....	No	.....
Texas:									
Abiline	Annually	Open and close	No	.....	Some	....	Built fires	No	Consumers do it
Austin	.....	.....	No	.....	No	....	.....	No	.....
Brownsville	Twice a year	Open and close, tightness	No	.....	No	....	.....	No	.....
Cleburne	Annually	Examine thoroughly	No	.....	No	....	.....	No	.....
Galveston	Quarterly	Open and close	No	.....	No	....	.....	No	.....
Hillsboro	Annually	Open and close	No	.....	No	....	.....	No	.....
McKinney	Annually	Open and close	One	Used fire	No	....	.....	No	.....
Plainview	Not regularly	Examine for leak	No	.....	No	....	.....	No	.....
Vernon	Hardly ever	.....	No	.....	No	....	.....	Yes[k]	.....
Weatherford	Not regularly	.....	No	.....	No	....	.....	No	.....
Utah:									
Salt Lake City	Twice a month	Open and close	No	.....	No	....	.....	No	.....
Vermont:									
Barre	Semi-annually	Open and close	Yes	Hot water or electricity	Yes	4 to 6 ft.	Electricity	Yes	Electricity
Bennington	Annually	Open and close	No	.....	Yes	6 ft.	Electricity	Yes	Electricity
Essex Junction	Twice a year	Open and close	No	.....	No	....	.....	Yes	Hot water through tin pipe
Northfield	.....	.....	No	.....	No	....	.....	Yes	Electricity
Richfield	Annually	Open and close	Yes	Dug them up	No	....	.....	Yes	Hot water
Rutland	Annually	Open and close	Yes	Steam or electricity	Some	4 to 6 ft.	Electricity	Yes	.....
Virginia:									
Charlottesville	Not often	Aqua-phone	Yes	With steamer	Yes	2½ ft.	With steamer	Yes	With steamer
Washington:									
Auburn	Not regularly	.....	No	.....	No	....	.....	No	.....
Centralia	Twice a year	Open and close	No	.....	No	....	.....	....	.....
Ellensburg	Monthly	.....	No	.....	No	....	.....	No	.....
Palouse	Twice a month	Open and close	No	.....	No	....	.....	No	.....
Port Townsend	Annually	Open and close	....	.....	....	....	.....	No	.....
Pullman	3 or 4 months	Open and close	No	.....	No	....	.....	No	.....
Winlock	Every three months	Open and close	No	.....	No	....	.....	....	.....
West Virginia:									
Fairmont	Twice a year	Defective parts	Some	Electricity	Some	2 ft.[b]	Electricity	Yes	Electricity
Princeton	Twice a year	Examine for leaks	No	.....	No	....	.....	No	.....
Wisconsin:									
Antigo	Annually	.....	Yes	Electricity	No	....	.....	Yes	Electricity
Baraboo	.....	.....	No	.....	No	....	.....	Yes	Electricity
Beaver Dam	Annually	Open and close	No	.....	No	....	.....	Yes	Small steam boiler
Columbus	Annually	Open and close	No	.....	No	....	.....	Yes	Electricity
Fond du Lac	Not at all	.....	Yes	Gasoline steamer	One	2 ft.	Electricity	Yes	Electricity
Green Bay	Twice a year	Open and close	No	.....	No	....	.....	Yes	Electricity
Janesville	Annually	Open and close	One	Electricity	One	[i]	Electricity	No	Consumers do it
Milwaukee	16 in. and larger annually	Open and close	A few	Hot water	No	....	.....	No	.....
Menomonie	Annually	Open and close	Yes	Electricity	Yes	7	Electricity	Yes	Electricity
Shawano	Annually	Open and close	Yes	Steam	No	....	.....	No	.....
Sparta	Not regularly	.....	No	.....	No	....	.....	No	.....
Whitewater	Annually	.....	Yes	Electricity	No	....	.....	Yes	Electricity
Wyoming:									
Rock Springs	Annually or oftener	Test operation	No	.....	No	....	.....	No	.....
Canada:									
Toronto, Ont.	Annually	Open and close	Yes	Steam	Yes	3½ to 4½	Cut out	Yes	Steam
Winnipeg, Man.	Monthly	Open and close	No	.....	Yes	7½	Tap one-inch hole and insert steam hose	Yes	.....

[a] 4.5 feet in sand, 4 ft. in heavy soil; [b] at dead ends; [c] hydrants pumped out in late fall and after each using; [d] keep drained and put a little wood-alcohol in them; [e] inspection being organized, will cover tightness, spindle and nut gears; [f] put one quart of salt in each hydrant we thought might freeze; [g] over a culvert; [h] above ground, not properly closed; [i] in meter boxes, including a number of meters; [k] usually too shallow; [l] near a large storm sewer.

[m] Pumped out some to prevent freezing. [n] Steam forced through rubber hose and piece of ¾-in. pipe pushed into the ground over the frozen main.

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Subscribers are requested to notify us of changes of address, giving both old and new addresses.

Contributed Articles and Reports.

Contributions suitable for this paper, either in the form of special articles or as letters discussing municipal matters, are invited and paid for.

City officials and civic organizations are particularly requested to send to Municipal Journal regularly their annual and special reports.

Information Bureau.

Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

NECESSARY WATER WORKS CONSTRUCTION SHOULD CONTINUE.

In all branches of business, both public and private, there is great uncertainty as to what classes of work patriotic citizens are justified in performing and what limitations upon the execution of them will be placed by the authorities at Washington. Among the various official and semi-official utterances that have emanated from the Capitol, the most definite one that has come to our notice is that those classes of public work that are essential to the health and welfare of the people should be continued if possible.

There seems to be little question that an adequate and safe water supply would meet this definition as fully as any other public utility, and that water works officials should consider it obligatory to keep their plants in an effective condition so far as it is in any way possible for them to do so. Pumping equipment must not be permitted to deteriorate to the point where fire protection is inadequate or the quantity of water is reduced below that required for the actual use of the citizens. The filtration plants must be kept sufficient in size and operated at full effectiveness, in order that the quality of the water consumed may in no way imperil the health of the citizens. On the other hand, however, waste of water should be curtailed where its continuance would require enlargement of plants or mains or the consumption of unnecessary amounts of fuel. These ideas are expressed at some length in resolutions adopted by the executive committee of the American Water Works Association and printed elsewhere in this issue.

This work should be done regardless of the expense involved. As to the cost, however, there is question whether improvements that will be needed within the next five years or so can not be performed as cheaply now as at any time within that period. In a paper prepared by Mr. McDonnell (see page 361), he gives reasons for believing that during the period of the war, (which it appears almost certain will last for at least one more year and possibly for several), prices of both labor and materials may go even higher, while after the conclusion of the war they need not be expected to return to those of a few years ago for a number of years, if in fact they ever do. If these conclusions are correct, it would be economy rather than extravagance to construct at once, so far as it is possible to do so, all works which are required for the needs of the present or the immediate future.

We believe, therefore, that it is the duty of water works superintendents this year to carry on all necessary improvements for which it is possible for them to obtain materials and labor.

AMENDMENTS TO THE CONSTITUTION OF THE A. W. W. A.

Probably the most important matter to come before the American Water Works Association at its convention next week is the adoption or rejection of proposed amendments to its constitution. Four changes are suggested by the advisory committee with the approval of the executive committee, these having to do with the qualifications for active membership in the society, the manner of electing officers, that of selecting places for holding the annual convention, and the expenditures of the local sections. The executive committee, in submitting these, apparently considers the second to be the most important of them, but it appears to us that the first amendment is no less so.

The purpose of the first amendment is to admit to active membership not only any officer of a water works, either municipal or private, but also anyone who acts as a technical employee for associate members of the association. These would include mechanical engineers in the employ of manufacturers of valves, hydrants, pumping engines, or other appliances used in water works; engineers, chemists, and bacteriologists employed by manufacturers of filter plants; and any individuals, we believe, who have expert knowledge concerning any materials or appliances used in water works construction or operation. Many of these have special and intimate knowledge concerning such appliances and materials which would undoubtedly qualify them to contribute valuable information to the discussions of papers that are presented before the society. It can hardly be questioned, however, that any information given or statements made by such individuals will be to a greater or less extent influenced by their connection with commercial interests. While they may be perfectly honest and sincere in expressing certain opinions and beliefs, it would be only human nature for them to be influenced by such connections and give greater weight to those arguments that would favor their employers; while they would not be apt to give voice to views which they might hold antagonistic to the interests of their employers. We believe that in the past no difficulty has been experienced by associate members in bringing technical information before the society in the form of discussions and papers, these then being given frankly as the statements of those whose commercial connections may influence them, thus permitting the members to make allowance therefor. It would seem, therefore, that in the matter of information derived by the members from these sources, little if anything would be gained by admitting such individuals to active membership.

The chief change in the status of such technical men would appear to be that of permitting them to vote and hold office; and this, it appears to us, is a matter to be most seriously considered. Other societies have already realized that anything affording a basis for a charge of commercialism in the official doings of a society have tended to lower the standing of the society in the eyes of professional men and also of the public. For instance, as active members, such individuals would have a perfect right to expect appointment on committees dealing with subjects in which they are especially informed; and yet it would probably be out of the question to place on a committee dealing, for example, with the subject of valves, representatives of all the valve companies; and as a result those not so represented might with justice claim that the findings or doings of such committees would presumably be more advantageous to their competitors so represented than to themselves.

Committee reports or conclusions of any kind adopted by the society, with a view to influencing the action of its members and of water works officials generally, would naturally be looked upon with more or less suspicion if it were known that representatives of commercial interests took an active official part in the preparation of such reports.

It is true that a number of engineers and scientific men who wish to join the society and who would be a credit to it, but whose connection with associate members now debars them from active membership, prefer to remain out of the society altogether rather than join as associate members. A few of these it would undoubtedly be to the advantage of the society to have in its membership; but as the amendment would presumably not permit the exclusion of any "civil, mechanical, hydraulic or sanitary engineers, chemists, or bacteriologists . . . employed by associate members of the association" because of such employment, the probability is that scores of individuals coming under this classification would apply for and receive active membership; and for the reasons above stated, we believe that the disadvantages of admitting all of these to full active membership would greatly outweigh the advantages, in their effect upon the standing which the society would have among other associations of technical men, among water works officials and with the public at large.

As to the second amendment, providing for the nominating and electing of members of a nominating committee, which in turn would make nominations for the offices to be filled each year, the procedure seems somewhat elaborate, but it is very possible that it will not prove to be unduly so in practice, and it would appear to overcome some of the features which interfere with the successful working of the existing system. The third amendment would apparently shorten the time required for selecting convention cities by the convention at large. More important, it would be calculated to secure selection based on valid reasons rather than upon persuasiveness of orators. The fourth amendment seeks to clarify the somewhat ambiguous phrasing of an existing article and is not expected to find any opposition.

EFFECT OF WAR CONDITIONS ON WATER WORKS.

The Executive Committee of the American Water Works Association a few days ago adopted a resolution, together with an extensive preamble which, together with an explanatory letter, has been sent to all the members of that association. This originated in the fact that the directors believed the effect of war conditions upon the maintenance and management of water works should be brought to the attention of the members, with the idea that some action be taken (presumably at the convention of the association next week) looking to an effort to obtain such relief as can be furnished by Secretary McAdoo and other government officials.

The resolution began with a series of "whereas's" which really contain the gist of the matter, the resolution itself being merely that they be brought to the attention of the members and through them used for the enlightenment of the public at large. These are as follows:

Whereas, war-time conditions unavoidably have developed cardinal difficulties in the efficient operation and maintenance of water works properties, both municipally and privately owned, and in some cases the situation and relief of this important public utility has become a subject of grave importance; and

Whereas, the very existence of a modern and civilized community depends upon a pure and adequate supply of water; and

Whereas, the water rates now existing were, as a rule, fixed before the war and were based upon conditions which then prevailed; and

Whereas, reliable information from a representative group of water works shows that the average increase in operating expenses in the past three or four years has amounted to some 40 per cent, and that during the same period the gross revenue of this group of water works has increased but about 7½ per cent; and

Whereas, the increased cost of operation, the difficulty of providing for maturing obligations, and of making necessary extensions to meet the requirements of the Nation's war needs and of expanding industries which water departments and companies share with all other public utilies, are, in the case of water works, intensified by certain conditions peculiar to this service as

(a) A water works can gain no relief by tempoary cessation of service at stated times or in certain areas; there may be moonlight schedules, heatless days and areas, less frequent train service, etc., but water service, from its very nature, must be continuous, both in time and extent. The needs of large industries or war needs cannot be met by diverting from other consumers. A water works must carry its normal load and at the same time take care of its emergency service.

(b) The Nation's war program, including the mobilization of the country's industries, indispensably requires extensions of service by water works. A water works extends its service and enlarges its facilities by increasing its pumping and purification equipment and by laying additional pipe. In such extensions iron products constitute the chief element, which products have increased in price enormously and probably more than any other commodity in general use.

Since 1915, iron pipe has increased in cost 150 per cent, and pumping machinery and filtration equipment from 100 per cent to 200 per cent.

Since there can be no enlargement and extension of industries to meet war needs without increased and extended water service, water works are powerless to avoid expenditures for this purpose and unable to escape the payment of such vastly increased prices.

(c) The greatly increased cost of operation, which affects all public utilities, seriously affects water departments and companies, in particular, for the reason that the largest single item of expense in the operation of water works is fuel. In normal times fuel constituted about 15 per cent of the total cost of operation. Now fuel cost is approximately 30 per cent of the total cost of operation. In addition to this, the cost of water purification has increased more than 40 per cent and cost of distribution more than 20 per cent of the normal cost of operation; and

Whereas, the general public, and in fact many State and municipal officials, appear not to visualize clearly that even properly imposed increases in the cost of labor and essential materials must of necessity likewise increase the difficulties and cost of managing water works properties efficiently; and

Whereas, considerations of equity and the vital necessity of maintaining continuous and adequate service require that the water consumer bear his proportionate share of such necessary increase in expense that water departments, whether municipally or corporately operated, should not be forced to operate at a loss or be deprived of the reason-

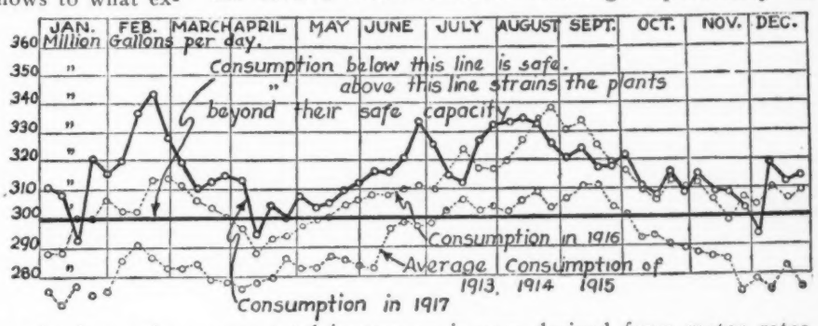
able return on their business, necessary to command capital, upon advantageous terms, for required extension and betterment of the service; and

Whereas, in time of war it is vitally essential that so far as is consistently possible it is necessary to conserve the health and well being of the public, and to guard against fire losses, by providing pure and adequate water service to the public, and to the industries, particularly those engaged in the manufacture of war materials; and

Whereas, without an equitable balance between the cost of operation and management of water works and the revenue received from service it is inevitable that the maintenance in a satisfactory manner of this vitally important essential must of necessity deteriorate.

WATER WASTE IN PHILADELPHIA

The safe capacity of Philadelphia's pumping plant is 300,000,000 gallons a day. The diagram shows to what extent this capacity was exceeded in 1917 and the four years previous. Chief Carleton E. Davis estimates that at least 85,500,000 gallons a day are wasted. For twenty-five years the chiefs of the Philadelphia Bureau of Water have been striving to get the city council to permit them to take effective steps to stop this waste, but in vain. If a break-down of the overtaxed plants should cause a water famine the voters of the most politics-ridden city in the country will have themselves to blame; the water bureau will be absolved from all blame by those who know the facts of the case.



WATER RATES AT NIAGARA FALLS.

Like many other places in the country, we believe, Niagara Falls, N. Y., is finding it necessary to meet increased demands upon its plant in spite of war prices and other conditions. In a report made a few days ago by O. E. Carr, city manager, to the City Council, he stated that the plant of that city is now being operated very close to its maximum rated capacity; so close, in fact, that extension of its business is impossible and there is not enough margin of safety for the unusual service which a fire may demand at any time. The pumpage during 1917 was 26 per cent greater than during 1916, and if a similar growth is experienced this year, provision must be made for increased pumpage.

Under ordinary conditions, the natural solution would be to increase the capacity. At present, however, the cost of this would be high and it might even be impossible to obtain the machinery for months, if at all. Mr. Shepard, the superintendent of the Bureau of Water, estimates that domestic users of water on the flat-rate basis wasted an average of one-half million gallons each during the past year, the total waste having been about 2½ billion gallons. If even an appreciable portion of this waste could be eliminated, the present capacity of the plant would be adequate for some time.

Mr. Carr therefore recommends that every effort be made to curtail the waste. A completely metered system is, in his opinion, the desirable plan for selling water, and he recommends that meters be required on all new services, and that all consumers who use city water for hopper closets, beer pumps, power washers and public garages be metered. The city would install all meters for domestic consumers and require them to pay for them, in quarterly installments in case easy payments are desired. Also, he would have it made the duty of any employee of the Bureau of Water to report any leaking, defective fixtures or any waste of water; and the superintendent of the Bureau should be given full power and authority to direct consumers in whose buildings such leaks or defects are found to install meters.

He also proposes that the flat rates be increased by 25 per cent, bills to be paid semi-annually in advance with 10 per cent discount if paid within ten days from the date of the bill (these latter being the conditions now in force). He also recommends revision of the meter rates so as to reduce by 1-1/3c per thousand gallons the charge to the smallest consumers and increase by 1c the charge to the largest consumers; the rates proposed ranging from 8c per 100 cu. ft. for less than 20,000 cu. ft. per quarter, to 3c per 100 cu. ft. for over 250,000 cu. ft. per quarter. A minimum meter rate of $1.50 per quarter is recommended. Mr. Shepard estimates that the revised meter schedule would give practically the same total income as is now derived from meter rates. As the flat rates are being increased by 25 per cent, this would serve to encourage the use of meters.

EXPERIENCED ENGINEERS WANTED.

Under the scheme of organization for the maintenance and operation of the cantonments and camps, a major takes entire charge and from four to six captains are placed in charge of the various utilities such as electric lighting, water supply, road construction, steam heating plants, building repairs, etc. In addition, there are a number of lieutenants. These officers are required to organize and control forces ranging from 240 men in a National Guard tented camp, to 700 men in a National Army cantonment where there are a number of regimental steam heating plants, beside a large central steam heating plant at the base hospital which in most cases has a capacity of 1,500 beds.

Philander Betts, Lieut. Col. Q. M. C. N. A., has expressed the desire of obtaining the names of a number of men who can be commissioned as majors, captains and lieutenants and assigned to duty at the various camps in connection with the maintenance and operation of these utilities. It is desired to obtain men above the draft age and those who, in addition to their technical knowledge, are capable of team work and working under discouraging conditions.

Any who feel that they meet these qualifications, or who know of technical men who probably would meet them, are requested to communicate with Lieutenant-Colonel Philander Betts, Construction Division, 7th & B Streets, S. W., Washington, D. C.

WATER WORKS OPERATION STATISTICS.

(Continued from page 365)

its use so almost universal as is shown by the table. According to the replies received, a great majority of the cities used electricity last year for thawing frozen services, and almost as large a percentage used it for thawing mains.

We hope to give in future issues considerable detailed information concerning the methods employed by the various cities, especially where these were at all out of the ordinary.

The WEEK'S NEWS

Roadbuilders Aid Oregon Farmers—Road Work for War Prisoners—Pennsylvania to Skip Good Roads Day This Year—Louisiana Health Officials Confer—Insanitary Schoolrooms in Philadelphia—City Wins in Impounded Funds Case in San Francisco—Suspend "Lightless Nights"—Canadian Government Controls Power—Police Regulations in Indianapolis—New York Firemen Sell Liberty Bonds—Government to Prevent Munitions Fires—St. Paul's Retrenchment Policy—Car Fares in Cleveland—Zone System for Rhode Island Fares.

ROADS AND PAVEMENTS

Federal Aid for Roads Used by Army.

Washington, D. C.—Representative Cooper, of Ohio, has introduced a bill appropriating $10,000,000 to aid the various states in the repair and reconstruction of highways that are being badly cut up by the extensive use of military motor trucks.

Road Builders Stop to Help Farmers.

Salem, Ore.—The Warren Construction Company and Calvert & Wolke, contractors on state highway work in Douglas county, have agreed to suspend work in that county for three weeks so that farmers may have an opportunity to use the men and teams that have been employed on the roads. At the request of B. L. Eddy, representing the farmers, the state highway commission put the situation up to the contractors, who readily agreed to the suspension. They are credited with patriotic motives by the department, the contracts containing no clause providing for suspension of the work. The farmers of Douglas county are much in need of teams to put in the spring crops. Applications for use of men, teams and equipment will be received from the farmers by a representative of the highway department and Mr. Eddy, of Roseburg, and the necessary arrangements will be made with the contractors.

War Prisoners to Work on Roads.

Washington, D. C.—The war department has decided to make the German prisoners of war now held in this country earn their keep. Orders have been sent to the army officers commanding the enemy prison camps at Forts McPherson and Oglethorpe, Ga., authorizing them to utilize the labor of the 1,370 inmates in completing a new system of roads about the posts. These prisoners were taken from German raiders. Under the regulations for the control of prisoners promulgated by the secretary of war, the adjutant general of the army has authority to establish the rate of wages to be paid for the labor of prisoners. It is expected that a sum representing 25 or 30 cents a day over and above the maintenance of each prisoner will be fixed. Each man's earnings will be placed to his credit at the camp exchange to be used in purchasing small necessities not included in the equipment furnished by the government. Prisoners are forbidden to have the actual cash in their possession. The proposal that interned aliens also be put to work has been taken under consideration. Under international law they cannot be forced to work except at such labor as is necessary to keep their place of internment in a sanitary condition. It is expected that an opportunity will be given to these prisoners to volunteer for other work at a fair rate of compensation.

No Good Roads Day in Pennsylvania.

Harrisburg, Pa.—A proclamation informing the people that because of the war there would be no "good roads" day in Pennsylvania this year has been issued by Governor Brumbaugh. Instead of working as volunteers on the highways the Governor suggests that all men and women devote their time to gardening in order to increase foodstuffs. The Governor says in part: "Whereas, Hon. J. Denny O'Neil, highway commissioner of Pennsylvania, already has with my approval arranged to turn the forces from the highways to the farms to help grow food for our army and navy and for our allies, thus evidencing a praiseworthy and patriotic purpose to aid the farmers of the State; Now, therefore, I, Martin G. Brumbaugh, Governor of the Commonwealth of Pennsylvania, do hereby announce that no good roads day will be observed in Pennsylvania this year, and instead thereof I call upon and urge all our people to go to the soil and in every way that wise counsel, honest toil or transportation of workers can do so, help increase the output of foodstuffs. It is a most vital and patriotic duty. It is to be regretted that our laws do not give me power to collect all loafers, rich and poor alike, and compel them for defined periods to work for the nation in this crisis."

SEWERAGE AND SANITATION

Borough Appeals Against Sewerage Rate Increase.

Collingswood, N. J.—The borough of Collingswood filed in the supreme court at Trenton its appeal to the court of errors to review the judgment of the lower tribunal in permitting a rate increase by the Collingswood Sewerage Company in excess of the franchise agreement with the borough. The state public utility commission refused to sanction the increase, but the supreme court reversed this finding. Several reasons were assigned by the borough in its appeals, together with the charge that the decision of the supreme court is illegal, oppressive and unjust. Counsel for the borough contends that the utility board is without jurisdiction either to increase rates or grant permission to file a new schedule of rates beyond the maximum provided in the ordinance, and also that the board has no power to fix rates without regard to the ordinances and contracts of the municipality. It is further contended that the borough was expressly authorized by statute to fix the maximum rates to be charged for service and that the acceptance of the franchises concluded a contract between the municipality and the company, which the utility board has no power to set aside. That the Legislature, under an act of 1911, granted to Collingswood power to fix the rates to be exacted by the company by irrepealable contract is another contention made by the borough. Several other reasons are presented, including the contention that permission given the company to use the streets and public places in the borough was granted by an ordinance authorized by law and that the rates fixed under this ordinance are just and reasonable and enable the company to maintain its property and equipment in proper condition.

Complying with the recent surprising decision of the state supreme court holding in effect that franchise contracts between municipalities and public utility companies, specifying fixed rates for service by utility as a consideration for franchise rights, are mere scraps of paper, to be voided without the consent of the municipality, the New Jersey Public Utility Commission issued orders empowering the Collingswood Sewerage Company and the Burlington Sewerage Company to put increased rates into effect. In the case of the Collingswood company, the board approved in substance the rates proposed by the company. The board, however, ordered some slight modifications in the schedule offered by the company, these being small decreases. The schedule proposed by the Burlington company was approved in its entirety, though the board recommended that the company make a careful study and canvass with a view to ascertaining whether or not the com-

pany would receive a large actual income by lowering the minimum rate to $8 or $9, rather than by insisting on the payment of a $10 minimum with its probable loss of patronage. "It is," said the board on this point, "a fact well established in respect to public utilities that an increase, for instance, of twenty-five per cent in rates, will cause a loss of ten or fifteen per cent of the attached customers, who refuse to pay the increase, and that a larger increase in rates will cause a corresponding decrease in the number of attached customers. This is a practical operating question and can only be solved by a careful study and canvass of the question involved." The new rates will continue as long as the supreme court opinion is the law of the state, which will be until it is upset by the higher court. If it is not upset in the pending appeal litigation, the increased rates, which are contrary to the franchise agreements between Collingswood and Burlington and the sewerage companies operating in these two municipalities, will become permanent. The utility commission originally refused the applications of the sewerage companies for increased rates on the ground that rates specified in the franchise agreements could not be abrogated without the consent of the municipalities involved, which consent was not had in either of these cases. That reasoning was pronounced unsound by the supreme court, and the radical decision has attracted widespread attention to New Jersey because of the great advantage given to utility companies under it. It was this "scrap of paper" decision by the supreme court that led George L. Record to ask Governor Edge to call a special session of the Legislature to have the utility law so amended as to clearly express the intent of the Legislature that franchise agreements between municipalities and utilities are to be considered irrepealable contracts, and not to be set aside by any agency of the state government without the consent of the municipality involved. Governor Edge declined to call a special session mainly because of the appeal now in the Court of Errors and Appeals. The rates asked for by the Collingswood company will add $25,600 to its annual revenue. The rates asked for by the Burlington company will produce annual additional revenue of $16,615. The new rates affect all classes of sewer service in Collingswood and Burlington. In each case the utility commission finds that the new rates are necessary if these companies are to earn a proper return upon investment.

State Department Meets Local Health Officers.

New Orleans, La.—About sixty parish and municipal health officers met here recently in response to the invitation of president Dowling, of the state health board, to consider improvements in sanitation and health conditions of the state. Dr. Dowling opened the convention with an address in which he emphasized the necessity of reorganization of the state health forces. Addresses followed by Dr. R. C. Devereaux and Dr. Jacob B. Geiger of the United States Public Health Service. Dr. Devereaux outlined a plan for financing a state association of doctors for the betterment of health conditions.

Health Department Finds 1,500 Insanitary Schoolrooms.

Philadelphia, Pa.—There are 1,500 classrooms in the Philadelphia school system which are insanitary and prejudicial to the health and safety of the pupils, according to the results of a medical survey of the buildings just completed by the department of public health and charities. More than 400 classrooms, the report charges, have not sufficient air per pupil; the ventilation facilities are poor or worse in the same number of rooms; the children in 500 rooms are without adequate light, on account of lack of window space; about 350 classrooms are badly overcrowded; in about forty buildings the toilet sanitation is harmful to health; the drinking-water accommodations in about ten schools do not measure up to the health standards; in the same number of schools the exits are inadequate; in three schools the fire escapes do not meet the modern demands, and in about sixty schools proper playground facilities are lacking. The points taken into consideration in grading the schools are ventilation, natural and artificial illumination, desk space, overcrowding of a classroom, toilet conditions, playground facilities, drinking water accommodations, wardrobe provisions and others. These conditions are caused primarily, it is believed, through the fact that the school plants include a large number of old buildings, which cannot readily be made to fit the modern health standards. The report indicates that the board of education has not made any efforts to eliminate many of the most objectionable features mentioned in former surveys. Among the schools about which the taxpayers have frequently complained is the Rutledge School, at Seventh and Norris streets. This building was erected during the Civil War. One of the most flagrant cases brought to light by the survey is the Rutledge Annex II, on Ninth street above Montgomery avenue. The entire school is rated "bad," which, according to the translation of the health authorities, means that it is prejudicial to health. The teachers' dressing room and toilet accommodations are "very bad" in this building. One small room is used as a dressing room and a kitchen. It contains a toilet, not partitioned off from the remainder of the room. This condition is unlawful.

WATER SUPPLY

Water Company Allows Higher Rates.

Terre Haute, Ind.—As a result of the action of the public service commission's decision, the case of the Terre Haute Water Works company in which that utility asked for an increase in water rates, 59 per cent of local consumers will pay 75 cents per month for their water instead of 60 cents, the rate last year. Nearly three-fifths of the entire list of customers of the Terre Haute Water Works Company will be required to pay one-half a cent per day more than they paid last year. "As nearly as I can figure it out we will get just 63 per cent of the increase asked for," said general manager Dow R. Gwynne. "That means we are granted 37 per cent less than the irreducible minimum, the least we figured we could get along with. For the larger consumers there is a greater increase in rates per consumer and to a few using water in larger quantities it means a difference of $30 per month per consumer. We asked for an advance of $10 from last year's rate of $40 on fire department hydrants, and the commission split the difference with us, granting an increase to $45." Following are the new rates for water, effective May 1:

For first 20,000 gallons per month, 22½c per 1,000 gallons.
For next 80,000 gallons per month, 20c per 1,000 gallons.
For next 200,000 gallons per month, 12c per 1,000 gallons.
For next 700,000 gallons per month, 7c per 1,000 gallons.
For next 1,000,000 gallons per month, 6c per 1,000 gallons.
For all over 2,000,000 gallons per month, 5c per 1,000 gallons.
With minimum monthly charges as follows:
Five-eighths inch meter, 75c.
Three-quarter inch meter, $1.
One-inch meter, $2; with fire protection, $3.
Two-inch meter, $5; with fire protection, $7.50.
Three-inch meter, $7.50; with fire protection, $11.25.
Four-inch meter, $10; with fire protection, $15.
Six-inch meter, $40; with fire protection, $60.
Eight-inch meter, $80; with fire protection, $120.
A penalty of 10 per cent will be added to all bills not paid within ten days after the same are due.
For each fire hydrant, per annum, $45.
Said fire hydrant service to include water for flushing sewers.

City Collects Taxes on Impounded Money.

San Francisco, Cal.—The Spring Valley Water Company has finally lost in its attempt to prevent San Francisco from collecting $227,496.95 taxes on the money impounded in rate suits pending in the Federal courts, the United States Supreme Court having handed down a decision sustaining the order directing payment of these taxes. If the city had lost in this suit it would have meant that a quarter of a million dollars which had been collected in taxes would have had to be paid back into the impounded fund. While the principal of the impounded money is $2,063,134.59 and the full amount, together with accumulated interest, is $2,281,595, there has been invested in Liberty bonds the sum of $2,000,000, so that the amount remaining upon which the city may collect taxes in the coming fiscal year is comparatively small. Assessor John Ginty estimates that the tax yield from the balance to the city in the fiscal year

1918-19 will be in the neighborhood of $3,600. The city's most important victory is in escaping from the necessity of refunding the taxes it had collected on the impounded money in the last four years. The case was begun against the city in the name of the six San Francisco banks, with which the money had been deposited by the Federal custodian. It was argued recently before the United States Supreme Court for the city by assistant city attorney Robert M. Searls. The money began to be impounded in 1908, when Judge Farrington granted a tentative 15 per cent increase in the rates, but owing to postponements granted the city, the cases have not yet been finally decided. Master Wright's decision, if it were to become final, would hand this money over to the water company in full. The 15 per cent difference between the ordinance rate and the Farrington decision, ceased to be impounded two years ago, when the Supervisors granted the water company a 15 per cent increase in the ordinance rate, on the company promising to furnish water to certain districts and when its vice-president said the company would endeavor to put in permanent pipes in advance of permanent street work. Since that time, however, miles of bituminous pavements have been put down over temporary two-inch pipes.

Enjoiner of Plant Construction Must Pay Damages.

Great Falls, Mont.—A verdict has been returned in favor of the city in the action brought against Joseph McClintock for damages which the city sustained while McClintock had the construction of the filtration plant tied up under injunctional proceedings last year. The amount of damages which the jury awarded the city against McClintock is $250, while a verdict of $150 was returned in favor of Olson & Johnson, the contractors. A. J. Fousek as mayor of the city also shared in the verdict as did William H. Harrison, the city clerk, but these city officials were made beneficiaries in the sum of only $1 each. Both the district and supreme courts had ruled against McClintock's attempt to restrain the city from proceeding with this construction work, and after the case had been won in the higher court damages were sought through McClintock's bond for the losses sustained all parties concerned while the court proceedings were pending.

STREET LIGHTING AND POWER

"Lightless Night" Suspended.

Washington, D. C.—The United States Fuel Administrator, Dr. Garfield, has ordered all state fuel administrators to suspend from April 25 until Sept. 1 the lightless night order which went into effect last November, when unnecessary street and sign lighting was prohibited on Thursday and Sunday nights of each week. The order states: "At the urgent request of the Liberty loan committee I have decided to suspend operation of the lightless night order. By reason of the late hour of lighting brought about by the daylight saving law the lightless night order will remain suspended until Sept. 1 next, when it will again become effective."

To Require Deposits on Extensions.

Springfield, Ill.—The Springfield Gas & Electric Company will not be allowed to refuse to make connections of gas mains and electric wiring for new customers during the period of the war, as it asked from the state public utilities commission, claiming the high cost of material and labor. The commission has issued an order requiring the company to continue to make the connections in question, but also allows the utilities company to require the prospective customers to deposit with the company the amount it costs to make the required extension. However, the commission provides that the company shall refund this money to the customer in amounts of not less than 25 per cent monthly and pay 5 per cent per annum interest on the deposits under certain conditions laid down in the order. A petition has been filed by the city of Springfield with the state public utilities commission, asking the commission to conduct an investigation as to the relative expenses borne by the electric light department and the steam and hot water heating departments of the Springfield Gas & Electric Company's power-house at 10th street and Capitol avenue. This action grows out of the Springfield Gas & Electric Company filing a petition with the state public utilities commission, asking for authority to increase the rates for steam and hot water heating service. It is believed by the city that the company, at the hearing now in progress before the state public utilities commission, is seeking to throw the burden of the expense of the heating department in order to secure an increase in rates.

Government Control in Canadian Power Shortage.

Montreal, Canada.—A number of factories producing munitions which depend on electric power generated at Niagara Falls have recently been handicapped by a grave power shortage estimated at 21,000 hp. In view of the serious condition, the Canadian Government has issued an order in council providing for the pooling and distribution of all power resources. The distribution will be directed by Sir Henry Drayton, controller of electric energy, regardless of existing contracts, and priority will be given to munition plants. Power companies which have steam generating plants are ordered to operate them at full capacity. It is expected that the execution of the order will make up the deficiency in the power supply.

FIRE AND POLICE

Two Firemen Hurt.

San Francisco, Cal.—Two firemen were seriously burned, many others narrowly escaped and at least $200,000 damage was done by a fire which wiped out three floors of the Merritt building. For a time the entire six-story building was threatened. The injured are captain Eugene Reardon and Louis de Martini. Thirty workers on lower floors of the building fled to the street down fire-escapes. The fire may have started in an X-ray machine factory when inflammable material dropped on the laboratory floor. The fire spread to the rooms of the California Electrical Company and then to the offices of the Railroad Supply Company.

New Regulations for Policemen.

Indianapolis, Ind.—Important changes in the policy of the Indianapolis police department were recently announced in a general order containing twenty-one rules governing the conduct of policemen in the discharge of their duties, issued by George V. Coffin, chief of police. The first rule stipulates that policemen are prohibited from discussing politics while in the discharge of their duty. This is a marked deviation from the policy of the department in the former administration, during which, it was shown, politics was the controlling factor and did more than any one thing to disorganize the department. One of the most important changes in the policy of the department is brought about by the rule which instructs policemen that they are not to arrest minors for misdemeanors. Instead of arresting the boy or a girl for some minor offense, as has been done in the past, the policemen are instructed to get permission from the captain in charge to take the child to its parents or guardian and explain the case. They are also instructed to inform the parents or guardian that a second offense will result in charges being fled in the juvenile court against the parent or guardian and the minor. This system it is the belief of chief Coffin, will place more responsibility on the parents or guardian of minors and at the same time will prevent a court record being made against first offenders, who are only guilty of misdemeanors. Another rule which will enable the members of the department to give an additional service to the public is the one which directs the district patrolman to make immediate reports of all street and sidewalk obstructions, all defects therein from which accidents may occur, and remove them when practicable; all places for which temporary permits are granted for building or where openings or excavations are being made and see that suitable precautions are provided for public travel; all

coal holes left exposed or insecure; all street lamps out of repair or not lighted at proper time or too early extinguished or any other place where dangerous or unwholesome trade is carried on; all nuisances and other matters affecting the safety and convenience of the public, or the interests of the city, including a report of all accidents or personal injury out of which suit against the city may arise. One of the rules cautions the men about the use of their revolvers and clubs and stipulates that such weapons are to be used only in case of self-defense or of violent resistance. The free use of clubs by some policemen during the former administration was one of the acts that brought much condemnation from the public. The issuance of the order marks the resumption of the daily bulletin system, at one time in vogue at police headquarters. This system proved an effective way of keeping the policemen informed as to the rules which they are expected to obey, as well as giving them information regarding the various happenings in their districts. Other rules are:

12. The receiving or accepting of any fee, reward or gift of any kind from any person arrested, or from any friend in his behalf while in his custody or after his discharge, or from any person, is prohibited.
13. Turnkeys and matrons must not solicit for attorneys or bondsmen.
14. Officers must not accept cigars or cigarettes from saloons or poolroom keepers, or gifts or loans from any source or class of people whatever.
16. All blind musicians and other mendicants are to be kept off the streets. These people will be cared for by the Charity Organization Society.
18. Officers will remove vehicles and all unnecessary obstructions from all streets and alleys.
19. When making regular calls over the police call boxes, the officers must keep the box open for five minutes so that the operator may talk to them if they are wanted.
20. All members of the department are prohibited from sitting down in crowded street cars. The citizens pay their fare and are entitled to their seats.
21. When an alarm of fire is given the patrolmen on a district and the next surrounding the one from which the alarm is turned on will hasten forthwith to the scene of the fire, and in case the fire should prove one of magnitude, they will call the captain.

Firemen Spectacular Liberty Bond Salesmen.

New York, N. Y.—April 29 was Firemen's Day in the Third Liberty Loan drive, and men with the apparatus collected about $1,000,000 in the streets. Without luncheon and supperless, they worked from early morning until late at night, and they showed New York some startling new wrinkles in the art of arousing patriotism and realizing therefrom. The most spectacular and most popular thing the firemen did was accomplished by means of a huge fire truck and a squad of active persuasive firemen. The ladder was raised to a height of about seventy-five feet, each rung representing a $50 bond. A fireman then mounted the ladder slowly as the subscriptions came in, a rung for each $50 collected by his comrades. When he got to the top, the $5,000 round, his arrival was greeted with due and appropriate ceremony and, then the whole performance was gone over again. Five different trucks started at 9 o'clock in the morning to canvass the city. The trucks and their crews covered every district in Manhattan from the Battery to the Harlem River. The firemen who accompanied the trucks gave up their day off to do so. At the Sub-Treasury at noon the crowd, gathered there to hear the usual speaking program which the Liberty Loan Committee has maintained since the drive started, hardly knew what to expect when the big truck and its accompanying red automobile, with a band, drew up in front. They cheered a little, however, and waited. In a few minutes the firemen riding on the truck had disappeared in the crowd, all except a man with a megaphone and several men who began to slowly send the towering ladder toward the sky. A second or two of stillness, and then the crowd cheered again. On the ladder were signs, $500, $1,000, and so on, and at the top was the mark $5,000. A fireman stood at the foot. Captain Luke Flannigan of Engine Company 33 then made a short speech explaining that the fire department wanted the help of New York city to send its men "over the top" for the loan. A cheer followed that echoed through Wall street, and immediately thousands of bankers and brokers began to vie with each other to send fireman Owen Ryan, the man on the ladder, "over the top." Ryan mounted steadily, and as he got near the top the crowd became quiet again, waiting. Suddenly he stepped on the top rung and whipped out a flag, waving it triumphantly, while a siren on the truck resounded its peal of victory. The crowd went wild, and Ryan was kept going up and down the ladder until he grew tired and his place was taken by a substitute.

Government to Prevent Munitions Fires.

Washington, D. C.—To minimize the possibilities of fires in munitions plants and all factories engaged on war work, the War Industries Board has created a fire protection section which will maintain a close inspection of all plants engaged on government work. It will be assisted by the intelligence bureaus of the army and navy and all local and district fire inspection services in the country, where circumstances warrant it will enlist the aid of the fire marshals of the various states and ask the cooperation of insurance underwriters. There have been many disastrous fires in war factories and grain elevators both before and since the United States entered the war. In the fires millions of dollars' worth of munitions and grains needed by the government and the allies were destroyed. According to an official statement, the fire prevention section is not intended to disturb existing agencies that are performing satisfactory inspection service; the first efforts will be directed to the improvement of conditions in the large number of improvised factories that have been started because of war work. The aid of municipal and state fire marshals will be enlisted. An earnest effort will be made to prevent duplication of inspection on the part of either government or insurance agencies, and also to coordinate all activities of the government so far as they relate to this work. The section's executive committee consists of the following: W. H. Merrill, chicago, president of the Underwriters' Laboratories, chairman; W. E. Mallalieu, New York, general manager of the National Board of Fire Underwriters, and Frank L. Pierce, Providence, R. I., president of the "What Cheer," and "Hope" Mutual Fire Insurance companies.

GOVERNMENT AND FINANCE

Expense in Getting Franchise Allowed as Capital.

Dallas, Tex.—The Dallas Railway and the Dallas Power and Light Companies have been allowed $100,000 each by the mayor and commissioners as additional capital value for "reasonable" expenses incurred in obtaining the franchises under which they now are operating. The companies originally asked for an additional valuation of $300,000, but the mayor and commissioners eliminated the expense items covering the straw vote, all advertising and other election expenses, hiring of halls, bands, etc. This involved a cut of $100,000 in the amount asked for, but, according to commissioner Winfrey, the list was gone over carefully and the amount decided on represents "every penny expended by the companies properly" for reorganization. Mayor Lawther said that the items recognized in the $200,000 total cover lawyers' fees, engineering expenses, accountants' fees and traveling expenses chiefly. "The big rub came in when we attempted to separate what was expended in 'acquiring property' and in 'financing it'," the mayor said. Commissioiner Doran's recommendation said: "I find that the negotiations were so extended and complicated, and the expenditures so varied, that it was impossible to positively segregate the money expended for the different purposes. I therefore moved that the board allow $100,000 as additional capital value to each of the properties as a reasonable amount for the purposes hereinbefore set out; said addition to property value to be added as of Nov. 21, 1917, shall reimburse the working capital of the respective companies in the amount of $17,660.08, this amount having been paid out of the working capitals for certain of the organization expenses herein allowed. While I am convinced that the present owners of these properties spent sums far in excess of the above amounts, I feel that $200,000 is as much as we can, after careful consideration, positively identify as having been spent for the purposes authorized and set out in the franchises."

Not to Discharge Employes in Reducing Improvements.

St. Paul, Minn.—Reduction of public improvement work in St. Paul this summer is expected to result in 1,500 men formerly employed in municipal activities being available for war work, commissioner Goss estimated. Street paving, grading, sewer construction and similar activities planned for this year would have required 2,000 men to complete. With the work postponed until after the war, only 500 men will be necessary to complete projects now under construction. The department of public works, the department of finance, the purchasing department and the department of public buildings will have their work reduced because of the war. This will not mean, however, that employes of these departments will be let go. Rather a system of leaving vacancies open will be adopted. "When men leave my department to enter war work, I do not fill their positions," Goss explained. "Also normal vacancies are not filled. This maintains those who need support and at the same time put my office on a war basis." Large contractors will feel the lack of city jobs. Among the firms which will be affected are Fielding & Shepley, Thornton Bros., O'Neil & Preston and E. T. Webster. They, however, are expected to be kept busy this year on unfinished work. Work on preparing orders, figures and estimates for new work will not stop. This will move right along, although on a lessened scale. The object will be to have a large amount of work ready to be started when the war ends. "If we have contracts all ready to let when the war ends," Goss explained, "it may aid prosperity in St. Paul tremendously. We will be ready to do our share towards spreading prosperity when the boys come home."

TRAFFIC AND TRANSPORTATION

Cleveland's Fares at High Limit.

Cleveland, O.—The Cleveland Railway is now collecting the highest rate of fare allowed under the so-called Tayler grant. The rate is 4 cents cash and seven tickets for a quarter, with a 1-cent charge for transfers and no rebate. The only difference between this rate and the one used during the previous week is the retention of the money received for transfers. Officials of the Cleveland Railway said that experience of a week with the next lower rate showed that it produced less income than the one discarded before that time. This was six tickets for 20 cents and 1 cent for a transfer with no rebate. J. J. Stanley, president of the company, declared in favor of an advance to the maximum when the first of the recent changes was made, but the company was met by an injunction in Common Pleas Court. This restraining order was dissolved by the Court of Appeals. It is said by some that even the highest rate provided by the franchise will not be sufficient to pay operating expenses and dividends and that the city council will finally be asked to amend the franchise to allow an increase in fares commensurate with the growing cost of operation. The increase just made will yield additional revenue of about $600,000 a year, but much of the additional funds will probably be absorbed in the wage adjustment in effect on May 1.

Legislature Approves Zone Fare System.

Providence, R. I.—The zone system of transportation charges for street railways for the lines of the Rhode Island Company has been finally approved by the state senate by the close vote of eighteen to seventeen. The plan already had passed the house. The new system went into effect on May 1. The action of the senate closes a controversy of more than a year in the Legislature, and one of two years before the city council. In its requests to the council the company said that it was facing bankruptcy and needed financial relief. The company asked that its franchise tax be reduced and that it be relieved from the obligation to pave certain streets. The city refused to extend any aid. A year ago the company went to the Assembly for relief. On the last day of the session a bill was passed appointing a special commission of three to determine an adequate fare system and to report to the Public Utilities Commission what it thought a good plan. The bill specifically ordered the Public Utilities Commission to follow the instructions of the special board. A report recommending among other things a zone system was handed in. The Public Utilities Commission, as ordered under the law, told the Rhode Island Company to put the zone system into effect on April 1. Then the Assembly suddenly appealed the law of a year ago and specifically ordered that there be no change in fares until the Assembly said so. The Assembly then named three Senators and four Representatives as a special committee to investigate the subject and look over the special report on the zone plan. This committee brought in a majority report favoring a 6-cent fare with eighteen tickets for $1. There were two minority reports, one for the zone system signed by one man and another for State ownership signed by one man. After debate, the minority report favoring zones was substituted for the majority report, and the act then passed. The zone system provides for a 5-cent zone in Providence, another at Pawtucket, one at Woonsocket, one at East Providence and one at Riverpoint in the Pawtucket Valley. Beyond these the territory is divided into so-called 2-cent zones. A 5-cent fare is a minimum charge anywhere, however. The transfer privilege in a 5-cent zone is extended to every patron riding into that zone. It is estimated by the company and the commission that the new plan will increase the gross income of the company about $500,000 each year.

MISCELLANEOUS

Government Nitrate Plant in Ohio.

Washington, D. C.—The War Department has announced that after careful consideration, it has been decided to locate nitrate plant No. 3, which will be composed of two units (3a and 3b) as follows: Plant 3a at Toledo, Ohio; plant 3b at Elizabethtown, Ohio. These two half units will equal, in capacity of production, the full unit now under construction in Sheffield, Ala., and known as plant No. 2.

Trade Board Organizes Housing Construction.

Flint, Mich.—The rapidly increasing expansion in industry in this city, and the consequent growth of population, last year resulted in the development of a grave housing scarcity. Recognizing this, the Flint Board of Trade organized a subsidiary, the Civic Building Company, to take active control of the situation. A survey was first made which showed that vacant parcels of land within the city boundaries were being held for speculative prices. The Civic Building Company, to escape high ground costs, bought a tract of 400 acres just outside the city and developed it according to plans prepared by Davis, McGrath and Kiesling, architects, New York City. The exterior treatment of the house is generally of the old New England village type with simple roof lines, close eaves and small pane windows. In ornamentation a touch of lattice work is introduced wherever desirable to modify large vacant spaces, and flower boxes are freely used on the sides of porches and under windows. Considerable attention has been paid to the grouping of houses by blocks through the harmonizing of a material and color scheme. The houses are set back from 10 to 20 feet and by grouping at different distances from the street line pleasing effects have been produced. The whole tract was put in the hands of William Pitkin, Jr., landscape architect, Rochester, with instructions to so arrange as to make the tract an integral part of the future city of Flint. A 22-acre woodland tract was reserved for park purposes, free sites for library, churches, amusement building and schools are provided. Two blocks were reserved for business buildings, and about 1,500 lots for houses were laid out, the minimum size of the residence being 50x100 feet. Work on 200 houses were begun last fall and continued through the winter months. The houses will contain from five to eight rooms each, and to range in cost from $1,500 to $2,000. Bathroom, hot-air furnace, drainage system and other modern improvements are provided.

NEWS OF THE SOCIETIES

CALENDAR OF MEETINGS.

May 7-9.—NATIONAL FIRE PROTECTION ASSOCIATION. Annual meeting, Chicago, Ill. Secretary, Franklin H. Wentworth, 87 Milk St., Boston, Mass.

May 7-10.—CANADIAN GOOD ROADS ASSOCIATION. Annual road congress. Secretary, George A. McNamee, 909 New Birks Bldg., Montreal, Que.

May 13-17.—AMERICAN WATER WORKS ASSOCIATION. Annual convention, St. Louis, Mo. Secretary, J. M. Diven, 47 State street, Troy, N. Y.

May 14.—AMERICAN ASSOCIATION OF ENGINEERS. Fourth annual convention, Chicago, Ill. Secretary, A. H. Krom, 29 South LaSalle St., Chicago.

May 15, 16.—SOUTH DAKOTA ELECTRIC POWER ASSOCIATION. Annual convention, Carpenter Hotel, Sioux Falls.

May 15-22.—NATIONAL CONFERENCE OF SOCIAL WORK.—Annual conference, Kansas City, Mo. Secretary, William T. Goss, 315 Plymouth Court, Chicago, Ill.

May 21-23.—ARKANSAS ASSOCIATION OF PUBLIC UTILITY OPERATORS. Annual convention, Hot Springs, Ark.

June 4-6.—INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS. Annual convention, Chicago, Ill. Secretary, Chief James McFall, Roanoke, Va.

June 4-7.—AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Spring meeting, Worcester, Mass.

June 13, 14.—NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual meeting, Hotel Traymore, Atlantic City, N. J. Secretary, T. C. Martin, 33 West 39th St., New York City.

June 24-26.—AMERICAN CONCRETE INSTITUTE. Annual meeting, Atlantic City, N. J.

June 25-28.—AMERICAN SOCIETY FOR TESTING MATERIALS. Annual meeting, Atlantic City, N. J. Secretary-treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia, Pa.

June 26-28.—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Annual convention, Atlantic City, N. J. Secretary, F. L. Hutchinson, 33 West 39th St., New York City.

American Water Works Association.

The following is the program for the sessions of the 38th annual convention of the American Water Works Association to be held May 13-17 in St. Louis, Mo., with headquarters at the Planters Hotel.

The executive committee will meet at 10 a. m. Monday morning. At 8.30 in the evening, mayor H. W. Kiel, of St. Louis, will deliver the address of welcome. There will then be an informal reception and dance at the Planters Hotel.

Tuesday, May 14, 9 a. m.—President's address, "Emergency Construction Work Due to War Conditions." Illustrated lecture, George W. Fuller. Report of canvassing committee on election of officers for 1918-1919; report of executive committee; report of special advisory committee on amendments to the constitution, and action on the amendments proposed; reports of officers and standing committees. Announcement of cup winner for section having made the greatest percentage increase of membership in the year 1917-1918.

1.45 p. m.—Golf tournament under the auspices of the permanent golf commitee of the Water Works Manufacturers Association and the American Water Works Association, entirely complimentary through the courtesy of the local entertainment committee; or visit to works of the Anheuser Busch Brewing Association for those who do not care to attend the golf tournament. Through the courtesy of the local entertainment committee.

8 p. m.—"Management of Public Utilities in Cantonments," Major P. Junkersfeld; "The Artesian Water Supply of Savannah, Georgia," E. R. Conant; "Design of a Tilting Dam and Its Relation to Back Water on the Gunpowder River," V. B. Siems; "Water Treatment Conditions at Council Grove, Kansas," Louis L. Tribus.

Wednesday, 9 a. m.—Four papers on special features of St. Louis water works: "Some Phases of Distribution Work," W. A. Foley; "The Double Forty-eight Inch Manifold at Bissell's Point," C. M. Daily; "The New 110-Million Gallon Pump at Chain of Rocks," L. A. Day; "Some Aspects of Chemical Treatment at St. Louis Water Works," A. V. Graf.

11 a. m.—Special order of business. Election of nominating committee and selection of place for holding the 1919 convention. Members of the various sections should have their selections made and be ready with nominations promptly.

12.30 p. m.—Boat trip on Mississippi river, starting at 12.30 p. m. sharp. Luncheon to be served on the boat. Trip to be made to the mouth of the Missouri river, stopping at St. Louis water works on return, arriving in city at 5.00 p. m. Trip by courtesy of local entertainment committee.

8 p. m.—"Literature of Field Water Supply," Jack J. Hinman, Jr.; "The Practicability of Adopting Standards of Quality for Water Supplies," Robert B. Morse and Abel Wolman; "Preliminary Analysis of the Degree and Nature of Bacterial Removal in Filter Plants," Abel Wolman.

Thursday, 8 a. m.—Superintendents' Day. Experience papers and general discussion on Frozen Service Pipes, Water Mains and Fire Hydrants, and New Maxims in Water Consumption based upon experience of the winter of 1917-1918. A number of short experience papers on these subjects will be presented.

2 p. m.—Discussion of Office Records, covering Distribution Mains, Gate Valves, Service Pipes, Pipe Laying, etc. Short papers, illustrated by lantern slides, will be read at this session.

8 p. m.—"Loss of Head in Service Cocks and Service Pipes," B. J. Bleisteine; "Lead Pipe Couplings," J. A. Jensen. Discussion of Resolution on Effect of War Time Conditions on Water Works Management.

9 a. m.—Informal dance at the Planters Hotel at 9.30 p. m. Courtesy of the Water Works Manufacturers Association.

Friday, 9 a. m.—Reports of special

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PROBLEMS CITIES ARE STUDYING WITH EXPERTS

STREET IMPROVEMENTS are to be made by Berwyn, Ill. E. Hancock is the consulting engineer for the work.

Erving, Mass., is to construct a WATER SYSTEM. The engineers for the improvement are the firm of Allen & Haywood.

A SANITARY SEWER SYSTEM is to be built by Pinebluff, Wyo., from plans and specifications prepared by R. D. Salisbury.

PAVING IMPROVEMENTS are to be made by Howell, Mich., the consulting engineer, George Champe, having completed plans for the work.

Pawnee County, Larned, Kan., is to construct about 27 miles of roads. The consulting engineering firm of Black & Veatch has been retained to make surveys.

Dearborn, Mich., is to construct a SEWERAGE SYSTEM, including sewers, disposal plant and pumping station. Plans and specifications for the system were prepared by the consulting engineer, Clarence W. Hubbell.

Weston, Mo., is to make PAVING IMPROVEMENTS according to plans prepared by the engineers, C. E. McCrae.

Cleveland, Okla., proposes to make PAVING IMPROVEMENTS, plans being in course of preparation by the Benham Engineering Co.

West View, O., is constructing a sanitary SEWER according to plans and specifications prepared by the engineering firm of Blum, Weldin & Co.

Adams county, Gettysburg, Pa., is to build a BRIDGE. Plans for the structure are to be prepared by Charles A. Williams.

Aurora, Ill., is having a PARK SYSTEM, including roads, lighting, water supply and other improvements, laid out. Revised plans are being prepared by the American Park Builders.

The Wood River Drainage & Levee district, Wood River, Ill., is to make DRAINAGE IMPROVEMENTS. Plans and specifications for the project were prepared by the engineering firm of Sheppard & Morgan.

INDUSTRIAL NEWS

Cast Iron Pipe.—Government prices remain constant. Quotations. Chicago, 4-inch, Class B and heavier, $57.30; 6-inch, $54.30. New York, 4-inch, Class B and heavier, $58.35; 6-inch, $55.35; 3-inch, $65.35. Birmingham, 4-inch, Class B and heavier, $52; 6-inch, $49; Class A, $1 extra.

The Permutit Company, 440 Fourth avenue, New York, N. Y., announces that Albert Tate Smith, lately manager of the R. U. V. Company, New York City, has returned to The Permutit Company, with which he was formerly connected, to take the position of assistant manager of sales. Mr. Smith is widely known in the water purification field.

The Asbestos Protected Metal Company, Pittsburgh, Pa., has changed its name to **Aspromet Company,** effective May 1, 1918. When this company was established in 1905, its sole product was Asbestos Protected Metal. The initial product meeting with universal favor the company added to the line other building materials that were used and bought by the same people who use and buy Asbestos Protected Metal. The company now produces a very complete line of building material specialties, many of which contain neither asbestos nor metal in their make-up. The descriptive name, Asbestos Protected Metal Company, which originally served so well, thus became restrictive to the point of being misleading; hence the change.

Construction Machinery in India.—According to consular reports, southern India, upon a resumption of normal conditions after the war, will offer a good field for construction machinery. Even under existing conditions trade has been very active, and much construction has been going on, but lately there has been a falling off, apparently, in both respects on account of general conditions—scarcity of tonnage, difficulty in obtaining materials, and general tendency toward retrenchment.

The greatest engineering undertakings in southern India, excluding, perhaps, the railways, are the irrigation projects. In addition to the immense works already under construction in the country or sanctioned by the Government, there are under consideration or investigation other works estimated to cost nearly $140,000,000. Most of the tools, machinery, and materials used for the great Government irrigation works are obtained in England through indents furnished the India office in London by the public-works department of the Government of India and those of the Provinces, and a large quantity of supplies and material also is purchased in India itself as convenience or necessity may require. In the Madras Presidency irrigation work is under the chief engineer for irrigation, department of public works, Madras. For the Native States of Mysore and Cochin, the Dewan, or Prime Minister, supervises all public work. For Hyderabad there is a special engineer in charge of irrigation. Some particularly large irrigation schemes are projected in Hyderabad. General public works construction in Madras, including even railways, is under the chief engineer and joint secretary to Government, public works department.

The considerable amount of harbor work that has been in progress in Madras, and a great deal more that is projected before completion of the harbor according to plans, is under the direction of the Madras Port Trust, a semigovernmental organization. The trust has lately asked the Government for an additional appropriation of about $1,000,000. A great amount of cement is used in the harbor work, besides which the trust operates and owns lighters, tugs, dredges, derricks, and cranes, dockyard machinery, light locomotives, and, in fact, all sorts of material used in such projects. Although nearly all of it is purchased in England it would be advantageous to write to the chairman of the trust. Harbor work is projected also at Cochin.

NEWS OF THE SOCIETIES

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committees: Depreciation, John W. Alvord, chairman; Revision of Standard Specifications for Cast Iron Pipe and Specials, John H. Gregory, chairman; Private Fire Protection Services, Nicholas S. Hill, Jr., chairman; Official Standards of Water Analysis, William J. Orchard, chairman; Mechanical Analysis of Sand, Phillip Burgess, chairman; Standard Specifications for Wrought Iron Pipe, A. A. Reimer, chairman; Classification of Technical Literature, Nicholas S. Hill, Jr., chairman; City Planning, Ernest P. Goodrich, chairman.

Unfinished business.

New or miscellaneous business.

Topical and general talks for the good of the association.

National Fire Protection Association.

The influence of the war will be felt at the twenty-second annual meeting of the National Fire Protection Association, which is to be held in Chicago on May 7, 8 and 9. The assumption of new or additional responsibilities by the chairmen of one or two committees may involve the postponement for a year of the consideration of particular technical problems; the presentation which is to be given of the activities of the member, the National Board of Fire Underwriters, during the present crisis will vividly bring home to members the importance of maintaining in full vigor at this time every agency of fire protection and prevention.

Notwithstanding the difficulties, a number of committee reports involving matters of moment will come before the meeting. The committee on "Field Practice" has been considering the whole question of "first aid" hand fire protection, in addition to continuing its investigations of the problem of gate valve control; contributions of great importance will be made by the committees on "Fire-Resistive Construction" and on the "Uses of Wood in Building Construction;" thorny questions will again be brought up for discussion by the committee on "Nomenclature;" the committee on "Safety to Life" will ask for final acceptance by the Association of a standard method of establishing the number of persons that may with reasonable safety be permitted in buildings of different types under a variety of conditions; and the committee on "Tanks" has prepared detailed specifications of performance in connection with the installation of scuppers. Several other committees are also expected to report.

The "round table" this year will be on the subject of "Fire Protection in Hotels and Apartment Houses," and it is also planned to have a special discussion on "Zero Weather Hazards."

A new feature will be the luncheon on Wednesday, May 8, at the Hotel La Salle, to be addressed by Dr. Gunsaulus, president of the Armour Institute of Technology. This is to be followed by an official visit to Underwriters' Laboratories.

PERSONALS

Anderson, A. T., chief of the Marshalltown, Ia., fire department, has resigned. Chief Anderson served in both the paid and volunteer departments for a period of twenty-six years, sixteen of which have been in the paid department. In his resignation he made application for a pension under the state law, which was refused by the council because it did not believe that the law governed in his case. He has been succeeded by James H. Ellis, a new member of the force.

Baker, C. M., has resigned his position as assistant engineer with the New York State Department of Health and has accepted an appointment as sanitary engineer in the United States Public Health Service. He is at present in Macon, Ga., engaged in work in connection with the control of malaria in the extra cantonment zones.

Edwards, L. V., professor of highway engineering, Washington State College, Pullman, Wash., is now assistant county engineer of Whitman County, with headquarters at Colfax. He will be an assistant to county engineer J. M. McCaw, and will act in the capacity of a consulting engineer.

Ellms, J. W., superintendent of filtration, in charge of the water purification works of Cincinnati, has resigned to become engineer of water purification, Cleveland, O., waterworks. He will have full charge of the West Side filtration plant, and will assist in the designing of the proposed East Side water purification plant.